8° 211. 201. Art.

LICENSED,

March 6th. 1690. *Rob. Midgley.*

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AN ACCOUNT

Of several

New Inventions and Improvements

Now necessary for England,

In a Discourse by way of LETTER

TO THE

EARL of MARLBOURGH,

Relating to

Building of our English Shipping,
Planting of Oaken Timber in the Forrests,
Apportioning of Publick Taxes,
The Conservacy of all our Royal Rivers, in particular that of the Thames,
The Surveys of the Thames, *&c.*

Herewith is also published at large

The Proceedings relating to the *Mill'd-Lead-sheathing*, and the Excellency and cheapness of Mill'd-Lead in preference to Cast Sheet-Lead for all other purposes whatsoever.

Tho. Hale

ALSO

A Treatise of NAVAL PHILOSOPHY, written by Sir *Will. Petty.*

The whole is submitted to the Consideration of our English Patriots in Parliament Assembled.

LONDON, Printed for *James Astwood*, and are to be Sold by *Ralph Simpson* at the *Harp* in St. *Pauls Church-yard.* MDCXCI.

BODLEIANA
BIBLIOTHECA

To the Right Honourable

John LORD *Churchill*,

Baron *Churchill* of *Sandridge*, Viſcount *Churchill* of *Aymouth* in the Kingdom of *Scotland*, Earl of *Marlborough*, and one of their Majeſties moſt Honourable Privy Council.

My moſt Honoured LORD,

IT *hath been obſerved by ſeveral of our late ingenious* Writers, *that an eminent* Venetian *Embaſſador, after a long reſidence in* England, *ſaying homeward, did caſt his Eye back on this Land, and ſaid in his own language,* O

Isola felicissima, &c. The happiest Countrey on the face of the Earth, did it not want publick Spirits among them: *Nor do I think that the* pudet hæc opprobria nobis, &c. *was in any Age so justly applicable to* England *on this account as in the present one, wherein Men generally depraved by a selfish inhospitable temper, do like the* Hedge-hog, *wrap themselves up in their own warm* Down, *and shew forth nothing but* Bristles *to the rest of the World, and cry out* Eureka! *when they have found a Stone to throw at an* Inventor *of any thing beneficial to Mankind, instead of giving a render helping Hand to the* Inventions *themselves, and which might with Justice be expected, since few or none come into the World with all the perfection they are capable of.*

But, My LORD, *thô this* Invention *of* Mill'd Lead *(how much or little soever I contributed to its first Conception, is matters not, I being as it's Birth concerned in a greater share and Interest therein, and the Transactions relating thereto, than any one else, although I willingly then admitted the use of other*

Names

Names more conſiderable to give Countenance and Credit to the Work, and to avoid Envy) *hath been accompanyed with the fate of all Inventions, namely, a peeviſh endeavour of ſome* narrow-ſoul'd *Men to* run *it down, yet according to the ſaying,* Unus dum tibi propitius eſt Jupiter, tu hoſce minutos Deos, flocci feceris : *Your Lordſhip with your great Heroical* Genius, *and your incomparable penetrating Underſtanding, having ſurveyed all the circumſtances relating to this* Invention, *and the paſt Tranſactions about it, and your having afterward been pleaſed to patronize the Inventors and Invention, I can eaſily be unconcerned at the Cenſures of ſmaller People who are concerned againſt it.*

My LORD, *I have been long ſince taught by a great* Philoſopher *of the Age, that* When Reaſon is againſt Men, they will be againſt Reaſon, *and have ſufficiently obſerved, that the way that moſt Men take to be cryed up for* Maſters *of Reaſon, is to make Reaſon* ſerve *them, that is, to ſerve their turn.*

I am not now to learn, that whoever attempts the ſettlement of any Queſtion, which would be the unſettlement of any mens Intereſt, *may be ſuſpected to have either an unſettled Fortune, and that like a New-comer to the Coaſt of ſuch a Queſtion, he comes to ſettle himſelf thereby, or to have an unſettled Head, and to be one who knows not that againſt any thing by which Men get their living they would not own to believe any that came from the dead. Thô the Proofs for any thing are as clear as the* Meridian *light, yet where Men are* Antipodes *to each other in Intereſt, at the ſame time 'tis* Noon-day *with the one, and* Mid-night *with the other.*

And moreover, Reaſon *as it reſembles Gold in being the moſt valued, ſo (as one ſaith) it doth too, in being the moſt* ductile *thing in Nature.*

We know how much Mechanicks *depend on the Rule of* Rectum eſt index ſui & obliqui; *and here it comes into my mind to entertain your Lordſhip with no unpleaſant or vulgar Speculation in Geometry, that* Maximus Angulus eſt recta linea, & minimus Angulus eſt

recta

recta linea, *the greateſt Angle and the leaſt are both the ſame with a right line.*

But if it were for the general profit or pleaſure of Men to deny that there is any right or ſtrait line, or that any Right Line can be made ſo much as for uſe, many would be found to deny it ſtrenuouſly, and who perhaps either would argue, that there is not in Nature any right Line, and that all Lines are Artificially made by the dulture of ſome point, or the meeting of two ſuperficies, making the edge of any thing, or the Contact of a Cylinder *with a* Plain, *and that neither of theſe wayes can produce a right Line, becauſe there is no true ſtrait* Superficies, *but what has inequality or hollowneß in it, and that conſequently the motion of any Point upon any uneven* Superficies, *or the mutual concurrence of two uneven* Superficies *can never produce an even or right Line, or who elſe would, if not cut off, yet jogg the Hands of thoſe they found making right Lines, or if they found any made, would either obliterate them, or apply* Microſcopes *to them, whereby*

ſome inequality or raggedneſs in them would be diſcovered, or they would pervert Witneſſes to ſwear, or Judges to decree, that they were not Right Lines, or perhaps they would turn the making of Right Lines into Ridicule, *according to the Humour of this Age, or according to the humour of an old* barbarous *former one, maliciouſly call it the* Black Art.

We know that according to the Sea-phraſe *one* Ship *is ſaid to* wrong *another, that excels it in ſwiftneſs of ſailing: And thus the* Shipwrights *and* Plumbers *may if they pleaſe think the Mill'd-Lead Invention hath* wrong'd *them in doing ſo much right to Shipping and Navigation in particular.*

Nor is it indeed poſſible for any New Invention, *how profitable ſoever to Mankind, to appear in the World, but that ſuch new* Illumination *muſt* ſtand *in ſome Mens* light, *and obſtruct their* pratique *in thoſe Arts of life wherein they were expert. Thus there is no doubt but the* Invention *of the* Sea-Compaſs *was maligned by the old dull* Coaſters, *and that of* Printing *by the* Hackney *Writers,*

and

and the excellent Notion of the circulation *of the Blood, by the old* Mumpſimus *Doctors, who being ſufficiently at eaſe by the Circulation of* Money *and* Trade *in the Realm, knew how to ſtuff their hollow Teeth with their Patient's Bread, without ſtudying* Anatomy; *the knowledge whereof hath been enriched by a full* third *part at leaſt within this laſt* Century, *as the learned Dr.* Henſhaw *tells us, in his very ingenious Book called* A Regiſter for the Air, *printed* An. 1677. *and wherein he hath publiſhed an excellent Invention of a* Domicil *or* Air Chamber, *and by means whereof in any part of our Native Soyl we may have the Air as pure as on the top of the* Pike *of* Teneriffe, *and made ſo pure as is not to be found on the face of the habitable Earth.*

And thus no doubt but the Goldſmiths and Silvir-ſmiths would think themſelves injured by any who could revive the Art of making Glaſs malleable, *which one in* Tiberius's *time had found out a way to do, and withall ſo yielding, and ſuch as would rather bow than break; for he bringing a Glaſs*

Vial to the Emperour to shew his Art, he threw the Vessel against the Stone-pavement, with which blow it was not broken but dented, and then taking his Hammer, he again beat out the dent: But he was secretly made away for his pains, as likewise several Inventors have been by the Dullards *who only had the Wit to do that, and the Assassinates have thought they might dispatch them as justly as Souldiers think they may deal so with those who come to beat up their Quarters.*

Yet however the fate of same Inventors hath been to fall *at the feet of Envious* Plebeian *Mechanicks, others of them have had that reward of their* diligence *in all Ages and Countreys,* to stand before Kings; *and the Vicegerents of the God of Nature have with peculiar respect treated such as* the King of Kings delighted to honour, *by imparting the secrets of Nature to them.*

And such respect hath been shewn to the Memory of useful Inventors *by the greatest Princes, that several* Historians *have mentioned it, that* Charles *the* 5th. *with a great* Parade *of his Attendants,*

dants, went out of his way to ſee the Tomb *of* William Buckeld, *who (as it was recorded in his* Epitaph*) was the* Inventor *of the* Dutch *way of* Pickling *of* Herrings, *which is ſo beneficial to thoſe* States, *that may make it be ſaid that* Amſterdam *is founded upon* Herring *bones: His Countrey-men it ſeems were ſo juſt to him, as to perpetuate the fam. of the* Invention *as well as the Name of the* Inventor *by a grateful Inſcription.*

And thus too was the Memory of Ludovicus a Culen, *Profeſſor of* Geometry *at* Leyden, *honoured by thoſe* States, *by their taking care that on his Tomb ſhould be engraven* his Attempt to find out the proportion between a Diameter and a Circle, dividing the Circle into more parts than Sand would conſtitute the whole Earth, and yet an Unite was too much, and a Null too little.

I am here minded of mentioning how the Tomb of Peter Pet, *Eſq; the Maſter-builder of* England (*and whoſe Anceſtors for upwards of two hundred Years have been Maſter-builders and*

principal Officers of the Navy *Royal*) *records his being the* first Inventor *of our* English *Frigats, and of which the* Constant Warwick, *built by him in the Year* 1646. *was the* first, *and which sort of* Shipping *is variously the most excellent and useful in the known World.*

And it having been the fortune of all the Master-builders *of that Family gradually to excel each other in their Art, I cannot here omit to take notice how Sir* Phineas Pett, *the Son of that great Artist, having built fifteen* Capital *Ships for the* Royal *Navy, besides many more of the lesser* Rate, *hath obliged his Country with a great deal of admirable* Invention *in the Fabrick of the* Kings fisher, *a fourth Rate, built by him in the* Year 1675.

For whereas all Ships before, since the first use of Navigation, were built by rising *Lines, which made not so regular a Figure in the Water, he built that by* Horizontal *ones, and so contrived the* Port-holes *therein, that most of her* Guns *might point to one* Center, *and thereby cause such breaches in the sides of the Ship she fought with, that could*

not

not be ſtopp'd with Pluggs, *and that brought her ſafe off from her being taken by ſeven* Algerine *Men of War, according to the* Relation *of it in the* Gazets *I have been informed of, and which could not have happened but by her* Guns *ſo* pointing, *making ſuch great breaches in their ſides as forced them to draw off. And ſo much hath the New* Invention *of the building her by ſuch Lines, contributed to the excellency of her ſayling, that I have read it in a relation of the* Engagement *between* her *and the* Golden Roſe *of* Algiers, *ſo much* famed *for her* ſailing, *printed in* London *in the Year* 1681. *that the* Kings-fiſher *much* out ſail'd *that Ship, and having taken her, found ſo much Water in her* Hold, *occaſioned by the great breaches in her ſides, which made her to ſink down within an hour after her Capture.*

What the great effects *of ſuch an* Invention *may hereafter be throughout the Maritime World, I know not,* Capital *Ships being now liable to be* ſunk *by* Bullets *which before they were not, by reaſon of the multitude of* Pluggs *and* Hands

to

to apply them, always in readineſs, unleſs a Shot had lighted in the Powder-room, as was ſuppoſed to have happened in Admiral Opdam's *Ship. But he having done ſo much impartial Juſtice to the* Invention *of the* Mill'd-Lead-Sheathing, *I am very well contented that it comes in my way here to retaliate to him by the juſt mention of the matters of fact whereby he hath obliged this Age and ſucceeding ones, to account him a Benefactor to his Countrey.*

And, my Lord, *I do think my ſelf the more obliged out of my love to my Native Countrey, to preſent your Lordſhip with this glancing View of theſe two great* Inventions, *becauſe they are very likely in a ſhort time to come among* Panciroll's Res deperditæ, *without care taken to prevent it; for King* Charles *the* ſecond, *who had very great Skill in the Myſtery of the* Shipwrights *Calling, hath been heard to obſerve it,* that the Fabricks of our *Engliſh* Ships did for ſeveral Years more and more degenerate from the Frigat way in which the *Conſtant Warwick* was built, to the way of our ſluggiſh old built

Ships,

Ships, and not at all adapted for ſwiftneſs of Sailing, and inſomuch that the *Conſtant Warwick* it ſelf being after the Death of the Inventor repaired by another Artiſt, was in its repairing ſpoiled of the excellency of its ſailing.

Nor have I heard of any other Ship built by the Kings-fiſher's *Lines, except the* Katherine Yatcht. *And therefore it is of great importance to the Nation that the Draughts of thoſe three Veſſels particularly ſhould be tranſmitted with great Care to Poſterity.*

I muſt not here forget to mention, that among the many Capital *Ships built by Sir* Phinehas Pett, *the* BRITANNIA *is by the* concordant *Voice of all the curious Judges of Naval Architecture allowed to be the beſt Ship in the World, and far exceeding in excellency of Building and Strength the great* firſt Rate *of* France, *call'd the* St. Lewis, *on the which is engraven this proud* Inſcription, Je ſuis L'unique de l'Onde, & mon Roy du Monde. *An admirable* Draught *or* Sculpture *of this Ship* BRITANNIA, *in four large* ſheets *of* Dutch *Paper, will ſhortly be publiſhed, with more mo-*

deſt

deſt but juſt Encomiaſtick Verſes in Latine, Engliſh, French *and* Dutch *under it, which I thinking fit to Copy out on my ſight of the Draught, ſhall here entertain your Lordſhip with thoſe of them that are in* Latine *and* Engliſh, Viz.

Ad Navem Britanniam.

Nomine digna tuo Navis, cui vela (Britanii,
Imperii titulo jure ſuperba tument;
Quid Tormenta vehis? Patrium pro (fulmine Nomen,
Fluctibus & terris quo modereris (habes.
Tum Cæſar tibi Numen adeſt dextra- (que refulgent,
Majora Æquorei Sceptra Tridente (Dei.
Quod Natura poteſt, potuitve Ars præ- (ſtitit in Te.
Ingenio Artificis, Robora tuta tuo es.

To

To the Ship Britannia.

Hail mighty Ship: None hath ſo juſt a
(claim
To ſwell her Sails with great *Britannia's*
(Name.
Thou need'ſt no Guns, that Name o're
(Sea and Land
Thunders aloud, and gives thee full
(Command.
Thy Prince's Hand a Triple Scepter
(wields,
To which great *Neptune's* Trident ho-
(mage yields.
The Builder's Skill equals thy ſtrength;
(in thee
What Nature could, what Art can do,
(we ſee.

I have the rather thought fit to mention the juſt celebration of this Ship, becauſe ſome impudent Scribblers of the Coffee-Houſe. *News-Letters preſumed laſt Summer to ſcandalize her, as if ſhe were* rotten, *and* diſabled

disabled *for Sea-service, whereas in truth she was then only put into the* Dock *for such necessary Repairs as most of the thirty Capital Ships required, which were built pursuant to the Order of Parliament, but from thence she will be launched out perfectly good, and as strong as ever.*

It was a proverbial *saying among the* Romans, Mœnia Sancta: *And the* profane Vulgar, *who write their despicable Lyes for Bread, ought not to be suffered to pollute the* Walls *of our Nation with their vile Pens; and such* Epistolæ obscurorum Virorum *should meddle with the* Gally-foists *of my Lord* Mayor's *Show, and not* first Rate *Ships: And I believe had any such* pauvres Diables *in* France *so belyed the Ship* St. Lewis, *they would have been Pillory'd, or Keel-hauled under her.*

Our excellent Statesman Sir William Temple (*who truly deserves the Name of a* publick spirited *Man, for the excellent Writings he hath published*) *in his* Survey of the Constitutions and In-Interests of the Empire and other Countries, with their relation to his Majesty

ſay in the Year 1671. *mentions* the ſtrength of our Shipping, as having for many Ages paſt (and ſtill for ought we know) made us an over-match for the ſtrongeſt of our Neighbours at Sea; *and ſpeaks of* the *Dutch* having been awed by the ſtrength of our Oak, and the Art of our Shipwrights, *&c. It is therefore not without reaſon, that the* Charter *of the Corporation of our* Shipwrights *hath obliged them not to communicate their* Art *to any Forreign* Prince *or* State. *But yet when I conſider that whereas the Contracts of the Navy-Board for building of Ships did 'till within theſe few Years paſt oblige the Builders to build with good ſubſtantial* Engliſh *Oaken Timber and Plank, and that ſuch not being now to be had, that word* [Engliſh] *is left out, and liberty given to build with forreign; and further conſider, that application was made to the* Miniſters *of King* Charles *the* ſecond *by the* Corporation *of* Shipwrights, *ſhortly after his* Reſtoration, *with their* Propoſals *in* Writing *for the* preſervation *and* encreaſe *of* Oaken *Timber* (*and* Copies *of which I have ſeen*

under

under the Hand of Sir Phinehas Pett *and* many *others of the most eminent of that* Corporation, *and that those* Proposals *being referred to the then* Attorney General, *he referring their Consideration to the* Navy-Board, *Sir* William Coventry, *Mr.* Pepys, *Sir* William Batten, *and the rest of the* Commissioners *of the* Navy, *did with great Judgment* Report *in* Writing *how and where a sufficient number of* Oaken *Trees might be* planted *in his Majesty's* Forrests, *and that the judicious* Report *from that* Board *carryed with it* self-evidence *of the* practicableness *of the thing with ease, and that had not so great a* Proposition *then evaporated, but on the contrary have been vigorously pursued, the* Oaken *Timber sufficient for the use of the* Navy *Royal had now been in a forward way to its sufficient growth: For it having been known that* Acorns *sown, have in the space of* thirty *Years born a* Stemme *of a Foot* diameter, *'tis obvious how soon they will bear a* stemme *of a foot and a half* diameter, *and that such* Timber *so of a foot and a half, will be sufficiently serviceable in the building of Ships. I say, when I consider*

these

these things, and fear how few else consider them here, and how many observe and consider them abroad, I think there is too much occasion to bewail our Soils not being fertile with men of publick Spirits.

Whether we shall at this rate come to build with English *Oak again before* Plato's *great* Year, *I know not: But,* my Lord, *this that I have said doth speak, (or as I may say) cry it aloud to us, that while we have the* Mill'd-Lead Sheathing *for Ships, without fear of losing it, that he will scarce deserve to be thought a* Patriot, *who at this time of day, when the Crown hath so little Timber in its* Forests *serviceable for Shipping, and hath Lead of our own for Sheathing, would have it unnecessarily send a great deal of Money for* Eastland *Firr for that purpose, of which the arrival here will be so uncertain, and indeed hazardous in time of War.*

My Lord, *I intend not to entertain your Lordship with Rhetorical flourishes and* Harangues *of the usefulness of the* Invention *of the* Mill'd-Lead Sheathing: *It is of* Age *in the World to speak for it self, and it hath had the Honour not on-*

ly

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ly

ly to have great unbyass'd *Artists* its Encomiasts, *but a great* Prince, *had a* profound *Judgment in the* Sh wrights *Mystery, I mean King* Char the second: *For as soon as Sir* Fran Watson *had acquainted him with* Invention *of Milling Lead for* Shea ing, *his Majesty was very impatient* he *had made experiment thereof, whe upon Lead was prepared by a small E gine, wherewith the* Phœnix, *a fou Rate was sheathed by Sir* Anthony De at Portsmouth, *which he saw done w care, the* Bolt-heads, *&c. being fas pursued, as they ought to be in a sheathing; and after divers* Voyages the Straits, Guinea, *and the* West I dies, *she had her sheathing strip'd at* ven Years *end to repair the* Plank, *b not for any defect in the* Sheathin *it self. Nor could those of the* Navy Board, *when at their attendance on t* Council *with their Complaints of* Eigh *Ships in* Twenty, *make the least* Obj ction (*though they were fairly challen ed to it*) *against the* Rudder-Irons, Bolt *or other* Iron work *of the* Phœnix; *th which made that judicious Peer, the the*

Ear

rl of Hallifax *declare, That if of* enty *Ships they complained of* Nine- n, *and had nothing to say against the* entieth, *he must conclude it to be the* rkmens *fault, for if they had done the* ber nineteen *as that* twentieth *Ship* e done, *they must have proved all as* ll *as she: The* King *also at the same* ne, *when they objecting that the* Mer- ants *did not use it, which they would if it was so good a sheathing as was* tended, *replyed,* That the Shipwrights whose best Friend the Worm was) anted not Skill to discourage them; t that their decrying it must soon be cerned to proceed from their inte- st. *And indeed it is obvious how the* ipwrights *do influence the* Merchants d Owners *in the* Sheathing *and other* epairs *of Ships, by their being general-* Part-Owners *in all the new Ships they* ild.

Nor is it to be wondred at that the King om *the beginning gave all the encou-* gement *he could to this* Invention; *for* en *he considered of the thing upon Sir* rancis Watson's *first laying it before him,* s *Majesty pressed him to make effectual*

Prepara-

Preparation for the Work, saying, would save him at least 40000 *l.* Year in his Navy, *the which was* improbable, *if it had not with that* encouragement, *use and application* Sheathing, Scuppers, Bread-rooms, *all other purposes it was capable of,* regard had to the charge and dam that a Wood-sheathing brings to the Pl by the great Nail-holes, *which they* to spile up at stripping, *and other* casualnesses *that attend Wood-shea* ing.

And here it occurrs to my thoug that his Majesty *being occasionally* Depford-yard, *as the* Workmen *we* bringing on an ordinary Straits-sheath with Wood upon one of his small Ships, asked them why they did not sheath h with Mill'd Lead, *and answer was ma* she was a weak Ship, and requir strengthning. *The* King *thereupon reply* they had as good have sheathed her wi Sarsenet, as such a sheathing to stren then her, *and saying,* Lord have Me cy on the Men who depend on th sheathing, if the Ship be not stro enough her self without it.

O

One would think now, my Lord, *that after so great a* King, *so judicious in all Naval* Mechanicks *had approved the great usefulness of this* Invention, *and after all his eminent* Master-builders (*and who were the only Shiprights* disinterested *from opposing it, in regard their subsistence depended only on their Salaries from the Crown*) *had done so too, it should be some potent and weighty Objection that should be a* Remora *to its progress. But according to the idle conceit of the Fish* Remora, *which mens fattishness hath made a* vulgar *one, namely, that it can stop the* motion *of a Ship under* sail, (*and some vain* Authors *have essayed in print to give reasons for such energy of that Fish; and other* Authors *have attributed the cause of that Fish's power to that mighty nothing of* occult qualities, *whereas the true cause of that* vulgar *Error was what an old famous* Naturalist *said of that Fish*, Flent venti, sæviant procellæ, semper Navem immobiliter tenet; *which implies no more, but that notwithstanding any violent* Tempests, *it always did stick to the Ship immoveably*) *a* superstitious

vain

vain imagination of an impossibility, namely, of the Mill'd Lead corroding the Iron-work, through some occult quality, hath been made use of as the Remora that hath hindred the progress of this Invention, when it was so fairly under sail, and had made so good a Voyage for the Crown, as to bring above Cent. per Cent. profit, besides the great advantage in sailing.

But it is no matter of Raillery, to observe that many excellent and most useful Inventions have been run down in the World by superstitious Fancies and Imaginations, and fortifying impossibilities with occult qualities; insomuch that our late Act for burying in Flannel, that was of such benefit to the Publick, was once in danger of being run down by an idle Notion of an impossibility that intoxicated the beliefs of the Mob, namely, that the Air was like to receive putrefaction by Flannels making the Dead to sweat; and as reasonably may the populace here imagine that the New-River-Water conveyed to dress their Meat through Pipes of Lead will corrode their entrails, if Lead be

such an occult quality to corrode Iron.
And as well may we be afraid to take
the Venice Treacle, because of its be-
ing long kept in boxes of Lead.

But your Lordships Judgment is so
excellent, that it cannot be imposed on
by a Non Causa pro Causa, or any
other fallacy; and that I might total-
ly avoid the least suspicion of one who
would impose either on your Lordship,
or on any of Mankind, while under the
shelter of your Lordships Name I write
to the World, I have here fairly and
candidly set forth the Measures of Fact
in the Transactions the Settlement of this
Invention hath occasioned on the Stage
of the World.

My Lord, I know it is fit for your
Lordships entire satisfaction, and that
of others, that I should mention what
ensued upon the Company's Reply to
the Navy-Board before the Lords Com-
missioners of the Admiralty. In short,
one of those Lords, who was likewise a
Member of the Privy Council, was by
that Admiralty-Board desired to carry
both that Report and Reply to the Coun-
cil-Board. And upon reading the Re-

port, his Majesty in Council was pleased to refer the whole matter back again to those Commissioners of the Admiralty; and thereupon the Company addressed themselves by the Memorial therewith also published, desiring that for the greater clearness of the matters complained of, that what the Navy Board or the Company had further to say might be laid down before them in Writing. And it is fit I should here acquaint your Lordship that the Company's Reply was drawn by the excellent Pen of Mr. Pepys, to whom the Author of that most elaborate Book, The happy Improvement of England, doth deservedly call the great Treasurer of Naval and Maritime knowledge, and of the great variety of the Learning which we call Recondite Evidence. And in a reflection on the Integrity of those Gentlemen of the Navy Board, who made the complaining Report against this Invention, whom I shall say thus Mr. Pepys his Character justly renders him superponderous to them in Moral, and much superiour in Philosophical and Political Knowledge, and the universal Knowledge of the Oeconomy of the Navy.

growth

Bu

But before there was any further proceeding, his Majesty thought fit to supersede that Commission for executing the Office of the Lord High Admiral; *And the King then taking the* Admiralty *into his own hands, and the Company having thoughts to Petition his Majesty to hear the whole Matter himself, they were by some Persons newly put into the Navy-Board, (who had for several Years shewed their approbation of the* Mill'd-Lead Sheathing) *advised to offer to that Board a New Proposal to sheath at a rate certain by the yard square, and with an intimation that the Navy-Board would take it more kindly, and that they were by this time satisfied that their former Complaint was by misinformation. This Advice was approved, and a new Proposal laid before the Board, the* 20th. *of* December, 1686. *which was much approved by Mr.* Pepys, *saying,* That he doubted not but they would comply with it; and declaring that on his part when it came into his way, he would promote it, as he had a full Conviction (*to use his own words*) that it was a great Service to the King;

and whether for that there was no occa-
ſion for a good while to ſheath any of the
Kings Ships, or by reaſon of a great deal
of peremptory buſineſs calling for the time
of that Board, or by the Company's hap-
pening to be ſlack in their application, I
know not; but it ſeems that after a years
time that Board was pleaſed to refexr to
two of their own Members, Sir Phine-
has Pett *and Sir* Anthony Dean (*who*
had both of them been Maſter-builders)
the Conſideration of the Company's new
Propoſal. *Nor could the Company wiſh*
for more equal Judges of the Mill'd-
Lead Sheathing, *than thoſe two worthy*
Perſons, who ſo well underſtood it, and
had formerly done ſo much right to it up-
on all occaſions, as judging it ſo much for
the King's ſervice: But the Kings ſer-
vice calling them from the Navy-Board
to a long ſtay at Chatham, *to which*
place it ſtood not with the Company's con-
venience to repair, and there preſs them
to make their Report; and a long Sick-
neſs ſeizing on Sir Phinehas Pett *at his*
return from Chatham, *and he being*
ſhortly after his recovery, employed in a
Journey about the King's ſervice in ſome

other

other of his Majesty's remote Yards; or what else being the true Cause thereof, as your Lordship may judge, so it is that the said Proposal, which is herewith also printed lies still before that Board without any further proceedings thereon ever since.

My Lord, *I have now let your Lordship see how I have been* damnatus ad Metallum *in the progress of this Invention: And considering the course of corrupt and degenerate humane Nature, no* Inventers *can promise themselves a nobler fate, thô the scene of their Invention lay in a nobler mettal.*

For as Sir William Petty *well observes in his* Observations *on the* Bills *of* Mortality, *that* if the art of making gold were known to one person, such single *adeptus* could not, nay durst not enjoy it, but must be either a Prisoner to some Prince, and slave to some voluptuary, or else sculk obscurely up and down for his privacy and concealment.

And so churlish hath the generality of Men been to Inventers, whose discoveries have only salved *the* Phœnomena, *that they have been unwilling to give*

those a good word who have taught the Age great things, yet such where the brightness of their knowledge would not have the operation of the Sun-beams, in putting out any mans Kitchin fire.

And this made the Great Tycho Brahe, *as to his famed* Discovery *console himself, by appealing from the judgment of the Age he lived in to that of* Posterity.

I shall here divert your Lordship, by entertaining you in his Study *which he had in an Island in* Denmark *by the Munificence of his Patron King* Frederick, *and where (removing the cover of the room) he could as he lay with his face upward in the Night time exercise his speculation with beholding the Stars. And there he had all the famous* Astronomers *painted, and the following Verses were added, each to the* Picture *to which they belonged.*

Salvete Heroes, vetus O Timochare (salve:
Ætheris ante alios ause subire po- (los.

Tu

Tu quoque dimensus solis, lunæque re-
(cursus,
Hipparche, & quotquot sydera Olym-
(pus habet.
Antiquos superare volens, Ptolomæe,
(labores,
Orbibus innumeris promptius astra
(locas.
Emendare aliquid satis Albategne stu-
(debas,
Sydera conatus posthabuere tuos.
Quod labor & Studium reliquis tibi con-
(tulit aurum,
Alphonse ut tantis annumerere Viris.
Curriculis tritis diffise Copernice ter-
(ram
Invitum, astriferum flectere cogis
(iter.

In the best place Tycho Brahe *had set his own* Picture *with the following Verses,*

Quæstis veterum & propriis Normæ
(astra subegi,
Quanti id, Judicium posteritatis erit.

Your Lordship who knows so many things can be no stranger to the fate of Galilæus *who after he had placed the Earth among the Heavens, found so much ingratitude in it as to be made a* Prisoner *in it for doing, by no meaner a Man than Pope* Urban *the* 8th. Gassendus *tells us of it in his* Life *of* Peiresk, *and how* Peiresk *wrote a Letter to him, to condole with him during his confinement, and employ his interest in a great* Cardinal *to procure his enlargement. Pope* Urban, *it seems, had wrote an idle Comment upon* Aristotle de Cœlo, *and* Galilæus *thought fit to confute him, giving him the Name of* Simplicius: *But the* Pope *got his Book condemned by the* Consistory *as* hereticál; ab arte suâ non recedens, *tho very unnatural.*

Thus dangerous a thing is it for a Man to over-oblige the World.

And here it comes in my way to observe how Dr. Robert Wood, *a person very famous for all Mathematical knowledge, lately trying to* salve *the Credit of this Age from being thought* barbarous *on the account of* Easter-day *being so ill fixt in our* Liturgy, *hath not been*

by

by any Author *I have met with, except one, so much as quoted for his illuminating us.* The only Person who quotes him for it, is the Author of The [illegible] growth of *England*, and he there in p. 241. like a careful observer of the Age, hath these following passages, viz. The great Controversie about *Easter*, that heretofore put all the World in a rattle, and almost shook it to pieces, what a toy is it self now reputed, insomuch that our latest Ascertainers here of the time of its celebration, seem'd not to think it tanti to awake when they were about it; and tho one lately having in our Almanacks two *Easters* in one Year, easily awaken'd the Non-conformists to take notice of it, and to say, that therefore they could not give their unfeigned assent and consent to all and every thing contained in, and prescribed by the Book entituled *The Book of Common-Prayer*, &c. And tho thereupon a Person of the Royal Society, very profoundly knowing in all the Mathematical Sciences, hath publish'd an infallible way of fixing *Easter* for ever,

(and that it may be no longer a fugitive from the rule of its practice, as it often is at present, nor dance away from it self, as I may say in allusion to the *vulgar Error* of the Suns dancing on *Easter-day*) and fixing it so as perhaps none else could have done, nor possibly himself any other way, yet hath this great right done to that great day, been by the generality of People not so much regarded as would *an Advice to a Painter*, or such like Composure have been.

But however, the Doctor *having published it but in a* quarter *of a* Sheet *of* loose *Paper, and that may be likely to come among the* Res deperditæ, *I shall here record that his* Invention *in his own words, that it may the better be transmitted to the* Judicium posteritatis, *the present World being not only a kind of* Areopagus *that sits in the dark, but also asleep.*

Novum

Novus *Annus Luni-Solaris*, *sive* Ratio Temporis *Emendata*:

Ita ut Mensis *quilibet* Initium *sumat a* Novi-lunio, *intra* unum *plus minus* Diem; & *quilibet* Annus, *intra* semimensem *ab* Equinoxio vernio.

I. *Incipiat* Calculus cum $\frac{21}{31}$ *Martii*, 1680.

II. Distribuatur inde *Tempus* in Periodos, continentes 38 Annos; *viz.* 24 *ordinarios*, (Mensium duodecim) and 14 *extraordinarios*, mensium tredecim.

III. *Anni cujuscunque*, communes & priores *duodecim Menses* constent è *Dierus*, *alternatim*, 30, 29, &c. Hoc est, *primus* Mensis, è diebus 30; *secundus*, 29; *tertius*, 30, &c. viz. *Impar Lunæ* pari, *par* fiet in impare Mense.

IV. In Periodi cujuscunque Annis 2, 5,

5, 7, 10, 13, 15, 18, 21, 24, 26, 29, 32, 34, 37; hoc est, in 14 *extraordinariis* Annis, intercaletur *Mensis decimus tertius*, Dierum 31, 30, &c. *alterne* etiam numerandorum: viz. in periodi Anno *secundo*, Mensis 13us intercalaris habeat 31 dies; Anno *quinto*, 30 dies; *septimo*, 31, &c.

V. Singulis (37 Periodis) 1406 Annis, *inserantur* 14 *Dies*: Hoc est, 1 Dies singulis 100 ½ Annis; vel potius, in 800 Annis, 1 Dies singulis 100 Annis; & in 606, 1 Dies singulis 101, *alternatim* interponatur.

Quo facto, æquabitur Temporis Ratio in *Secula seculorum*. R. W.

Mensura Mensis *Medii Synodici* & *Communis* secundum Astronomos, *viz.*

		d.	h.	′	″	‴
Hipparch.	*Ptolom.*	29	12	44	3	15 44
Lansberg.	*Vendelin.*	29	12	44	3	12
	Kepler.	29	12	44	3	10 50
Copernic.	*Reinold.*	29	12	44	3	10 38
Vieta.	*Clav.*	29	12	44	3	10 43
	R. W.	29	12	44	3	10 27
	Dechales.	29	12	44	3	10 9
	Rickiol.	29	12	44	3	10
	Bulliald.	29	12	44	3	9 37
	Tycho.	29	12	44	3	8 39

A

A rectified Account of TIME, by a New Luni-Solar Year; So as the beginning of every Month shall be within about a Day of the New Moon; and of every Year, within half a Month of the Vernal Equinox.

I. LET the Account *begin* with *March* 10. 1680. From thence —

II. Let *Time* be divided into *Periods*, of 38 Years each; *viz.* 24 *ordinary* Years, of *twelve* Months; and 14 *extraordinary*, of *thirteen* Months.

III. In *every Year*, let the *twelve* first common *Months* consist of *Days* 30, 29, &c. *alternately*; *viz.* the *first* Month, of 30 Days; the *second*, of 29; the *third* of 30, *&c.* that is, The *od* Months, of even days; and the *even* Months, of od days;

IV. But in the *Years* 2, 5, 7, 10, 13, 15,

15, 18, 21, 24, 26, 29, 32, 34, 37, every Period, *viz.* in the 14 *extraordinary* Years, let a 13th *Month* be intercalated, having Days 31, 30, &c. *alternately* also; *viz.* the intercalar Month of the *second* Year of the Period to have 31 days; of the 5th *Year*, days; of the 7th, 31, *&c.*

V. Let 14 *additional Days* be inserted every (37 Periods) 1406 Years; that is, 1 Day every 100 Years and of a year; or rather, 1 Day every Years, for 800; and for 606, 1 Day every 101 Years, interchangeably. The which being done, will adjust Account of Time for ever. R.

The Author in that Book mentions having chosen in the conjuncture in which he writ, to build his Fabricks of Numbers and Calculations on the course of Popery and the Papal Usurpation; and that finding that Mens Fancies at that time relished no subject grateful but Popery, he made that the Vehicle of the Notions he meant as Physic to cure their Understandings: *And he then hits a blot in the Papal Tenets that*

ever hit before by any Protestant Writer; namely the rendring it to be one of those Tenets, That it is lawful to burn a whole City, *in which the major part are* Heretick*s, expecting such a* Discovery *would be very welcome to the* populace *in that* Conjuncture.

His so much and so often celebrating the Royal Society *throughout his* Work, *was too a stemming of the tide of* humour *that prevailed with a great part of the Age, who knowing little either of the Old or New Philosophy, or real Learning and* Experimental Philosophy, *value themselves on the* ridiculing *and crying down those who advance the same.*

And having thus again referred to this book of the [illegible] *and to which I do but common Justice in representing it full of most useful Inventions and new* Discoveries *in Politicks, must refer to the common fate of Discoverers it hath met with, namely, in finding the World an unteachable* Animal. *I do not account the Author's great* Notion *in* p. 112, *new, namely,* That the knowledge of the Numbers of the People is the *substratum* of all Political Measures: *For that*

that Theſis *thoſe words of the* Capt
of our Salvation *have long ſince tau*
the World, namely, What King going
make War againſt another King,
eth not down firſt and conſulteth w
ther he be able with ten thouſand
meet him that cometh againſt him w
twenty thouſand? or elſe while
other is yet a great way off, he ſende
an Embaſſage, and deſireth Conditi
of Peace?

But after ſo great a Miniſter *of St*
as Myn Heer Van Beuninghen *had*
De Leti *hath mention'd it in print*) *ma*
the People of England *and* Wales *to*
but two Millions: *And after ſo illuſt*
ous a Writer *as Dr.* Iſaac Voſſius *in*
Variarum Obſervationum liber, *de*
cated to King Charles *the* 2d. *had ma*
the People in England, Scotland *a*
Ireland, *to be but* two Millions, (
both of them probably had read the O
ſervations *on the* Bills *of* Mortality *whe*
in excellent fine-ſpun Notions *had made*
People *about ſix* Millions) *his ſo large*
inſtructing us out of Records, (*and*
gainſt which there is no averment) *a*
particularly out of the Returns *of all t*

Cou

Counties of England and Wales upon several late Pole Acts; and out of the Numbers of the Conformists and Non-conformists upon the Bishops Survey made in the Year 1676, that the People of England and Wales are above eight Millions (and indeed that we may probably conclude them to be about ten Millions) may be said to be an happy New Discovery for us in Politicks, he being the first who evinced it out of Records, and wherein his Benefactorship to his Countrey in the doing it at his own charge, might in the paying of Fees to Clerks and Registers well be thought to surpass the charge of the impression of that voluminous Work; without reckoning in the great charge he must have been at in having accounts of various importations taken by Officers of the Custome-house out of their Books, as particularly in p. 284.

The Author gives well-grounded Accounts of the Numbers of the People in France, Spain, Flanders and Holland: But if he had took the pains to calculate the Numbers of the People in China, Æthiopia, or Tartaria, it had been as acceptable to many of our continuando-talkers.

talkers of Politicks, and to some
would take it ill not to be vogued
first-rate Politicians, though they
spent a thought about reducing Politi
ad firmam, by Number, Weight
Measure, as this Author hath done.

I shall commend to your Lordship
frequent Conversation with this Bo
as containing in it more variety of
litical Calculations than you will find
all Printed Books in all Languages:
it is the rather worthy your serious
usal in this Warlike conjuncture of ti
because the Author hath in so nervou
Manner given our English World so
ny New Directions about the Modus
our being furnish'd with the sinews
War, and in apportioning great Ta
with great equality, the want whe
is in effect the only grievance in pub
Supplies. And this your Lordship
find if you consult what he hath in p.
and out of Sir William Petty's Verb
Sapienti, in Manuscript, viz.

If a Million of Money were to be raised in *England*, there should be levied on the

	M. lib.	
Lands	216	viz. $\frac{1}{10}$ of the Rent.
Apparel	54	$\frac{1}{40}$
Personal Estate	69	$\frac{1}{50}$
Housing	45	viz. 12 d. a Chimney in *London*, 10 s. without the Liberties, 6 d. in Cities and Towns, and 4 d. elsewhere.
People	625	at 2 s. 1 d. per Head, or rather a Poll of 6 d. and 19 d. Excise, which is not full $\frac{1}{12}$ part of the mean expence.
Total a *Million*	1000	

There is half as much more paid now by the Land-tax alone than in the Million distributed on the several Fonds as above. And by the Rule of Sir W. P's.

Cal-

Calculation of a Tax of one Millio *above six* Millions *may be raised, a no Man feel it much, if equally lai And thô it falls heaviest upon* Perso *yet according to it no Man will pay tenth of his yearly expence.*

It is certainly now the Opus diei, *a propos what he had said before in th* Page, *viz.* That he believed that t future State of *Christendom* will nece rily prompt all Patriots instead of st dying to make men unwilling to pr mote publick Supplies, to bend the Brains in the way of Calculation shew what the Kingdom is able to co tribute to its defence, and how to it with equality.

Your Lordship will find this Book s at the Shop of William Rogers, *Boo seller, at the* Sun *over against* St. Du stans Church *in* Fleetstreet, *as I find in an* Advertisement *thereof in one the New* Almanacks *for the Ye* 1691.

I must frankly *own that I should n have repented of my expence in the pu chase of this* Book, *had there been* Calculation *in it but that in* p. 188

an

nd 89. *where the* Author *Calculates* he number *of the now* living *here, who were born since the* Year *in which our* Civil War *ended, or were then* Children, viz. *of such* Years *as not to have* experienced *or been sensible of the* Miseries nd Inconveniencies *of the* War, *and a* Calculation *of what* Numbers *of those* who lived *in* 1641. *are now* dead, *and* what proportion *of these* now living who lived *in the time of the* War *did* ain *by the* War, *and of the* number f such *in* Ireland *and* Scotland. *The* Au- hor *giveth a very* momentous *reason* r *the* finding out *those things by* Calcu- tion, *and the which might well seem* mpossible *to be perform'd. For that* inces *and their* Ministers *being ratio- ly to be steer'd in their apprehensions the danger of Civil War by the great* ule of Dulce Bellum inexpertis, *ought refully to have their Eye on the* Num- rs *of such* inexperti *in any long time* Peace.

So little regard hath been had by our eat Political *Writers to Matters of* lculations *and* Accounts *of the* Re- nues *of* Princes, *that I have in the*

great

great. Thuanus *observ'd but* one *pass*
relating to the same, and which by
Author *is* cited, *p.* 246. viz. *as to*
Receipts and Expences of Lewis
13th. *for the* Year 1614. (*and in*
250, *out of his own Observation he m*
the Expences *and* Receipts *of the*
sent French *King more than* quadrup
since, *as to what they were in the* Y
1614.) *and in the so much cry'd up*
litical Treatise call'd Nouveaux Inte
des Princes de l' Europe, *and comm*
ed by the Author of la Republique
Lettres, *there is little or nothing*
such Political Calculations *contained*

But the at present in the many
curious *Calculations presented to the*
by that Author of the Happy
growth State of *England*, *he doth as to the* R
ble *of* Readers, Vinum raris præm
strare, *whereas* Water *would have se*
ed their turns as well, yet I believe
impression on Men of refined *thought*
sense *will be such as to make the way*
writing of Politicks *hereafter with*
Calculations, *grow as much out of* Fa
on *as the* garb *of* Trunk-breeches.

My Lord, *I have herewith for*

Lor

Lordships farther Entertainment thought fit to publish *Sir* William Petty's *rough draught of* Naval Philosophy. *The* filings *of* Gold *are precious, and a* Schytz *or hasty Piece of Painting done by a great* Hand *is of great Value. To have drawn so great an historical Picture of that* Philosophy, *as he had the* Idea *of in his Mind, would have took up his whole Life: And he therefore considering the little value the* Age *hath for such Curiosities, thought it only worth his while to finish this Piece up at one sitting, and to shew Posterity what he could have done. But in this as it is, the* Judicious *few will find many a* Coup de Maitre, *and may instruct themselves thereby in some very considerable principles relating to* Naval *and* Maritime *knowledge.*

My Lord, I know that Providence *hath so disposed of the course of your* Lordships *Life, as to call you to* do *things that are to be* written of, *rather than to* read *things by others already* written. *Your* Lordships *great and successful* Courage *and* Conduct, *lately so* conspicuous *to the* World *in the taking of* Cork *and* Kinsale, *will employ the* Writers *of*

the

the Annals of our Nation, and adde further lustre to the Name of Marlborough, which was so much ennobled your Lordships Predecessor, that the great Poets of the Age crown'd him with the just Laurels, when they said,

Marlborough who knew, and dur
(do more than a

There is one noble Invention that wa there tributary to your Lordships succes I mean that of Guns: But as great an noble as this Invention is, (and whic was found out by a German in the Ye 1378. and whereby the Lives of Me if we reckon by wholesale, are bette preserved in the defence of Cities, an by the fate of Victory being sooner decide in Camps, that hinders Armies from s much butchering one another as former ly) it hath been by snarling Writers great Name maligned; and because i it some Men were killed by retale, hath been render'd execrable and di bolical; and that not only by Poly dore Virgil, but by Cardan and Me lancton.

Ne

Nor need it be told your Lordship how much this Invention *hath been improved since its first use. The manner of contriving and applying them hath not been less improved than the way of preserving light for the Passengers in our streets, since the finding out of* Lanthorns *hath: The only* Author *I know, who hath recorded the* Original *of* Lanthorns *is our learned Antiquary Mr.* Gregory, *in his learned* Notes *on* Ridley's View, *&c. He there tells us,* p. 286. That the Inventor of Lanthorns was our King *Alured*, in whose dayes the Churches were of so poor and mean a structure, that when the Candles were set before the Relicks, they were often blown out by the Wind which got in, not only *per Ostia Ecclesiarum*, but *per frequentes parietum rimulas*; insomuch that the ingenious Prince was put to the practice of his dexterity, and by occasion of this *Lanternam ex lignis & bovinis cornibus pulcherrimè construere imperavit*; by an apt composure of thin Horns in Wood, he taught us the Mystery of making Lanthorns.

But our New *invented* Glaſſes a
Lamps, *that caſting out ſo powerful a*
extenſive, and withal ſo durable a
chearful an Illumination, as to make M
paſſing about their Affairs in the Nig
not only tolerable *but* pleaſant, *ha*
much outdone the Lanthorns *invented*
our Monarch, in diebus illis.

Yet on the publiſhing of a Paper co
taining the various uſes this Inventi
might be of to the Nation, and where
in it was mention'd inter alia, *that* the
Lights might for the publick good
employed at the Light-houſes, whic
give directions to Sea-faring People
dark and ſtormy Nights; and that the
Lights being ſo clear and ſtrong, a
continued with ſo much certainty
might probably ſave many from Ship
wrack, where the u'ual Coal-fires o
Candles often fail, by either not givin
ſufficient Light, or by the uncertain
of theſe Lights, ſubject to ſo many a
cidents as doth often occaſion the gre
loſſes both of Men, Merchandize an
Veſſels: *The Patentees of theſe Ne*
Lights being invited to diſcourſe wit
thoſe that have the Charge, and re
ceiv

ceive the profits of the Light-houses, they said, they thought they came to save their Candles, but since the Oyl necessary to maintain these Lights (though a Pint, which would cost about a Groat, they were told would serve one Lamp burning twelve hours) was dearer than Candles, they declined the use of these Lamps; whereupon the Patentees telling them, they thought the saving of Mens Lives and Goods to be of more importance than the saving a few Candles, desisted from further application.

I might here too instance in the Invention of the Scarlet or Bow-dye, the exportation whereof hath brought us in return so much Treasure, was put to it to make its way into the World through much opposition. And thus is, and was, and always will the birth of every New Art and Science be of difficult parturition, and the Inventors be enforced to cry, Fer opem Lucina, I mean, to crave aid and Patronage from such generous and Heroical and publick spirited men as your Lordship.

My Lord, *about eighty Years ago the* Invention *of the* New-River-Water *was much labour'd, and it was a kind of* partus Elephantinus, *about ten Years in bringing to perfection by Sir* Hugh Middleton; *but* Stow *tells us of the great* danger, difficulty, detraction, scorn, envy *and* malevolent interpositions *it first encountered with.*

And indeed it may be said, that after the six *dayes Work and* Adam's *Fall the World was yet a kind of* Chaos *as to the use and service of Man, 'till necessity and humane Industry set his Reason to work, and by degrees to invent and contrive how to apply and dispose the things he found therein best for his ease and service; and teeming* Nature *goes still big with new* Inventions *to improve the things we have, and is ready to bring them forth, whenever Philosophical and Industrious Men lend her their Midwivery: And for this purpose I am thinking, it was a noble and ingenious saying of* Seneca, Pusilla res mundus est, nisi in illo quod quærat omnis mundus habeat, *Senec. Nat. Qu.* l. 2. *par.* 3. *i.e.* The World were a poor little thing, but for its affording ample matter

ter of reſearch and enquiry to all ſuc-ceeding Ages.

My Lord, *there is another incompa-rable* Invention *that was found out not many Years ſince, and which without ſome ſuch Patriotly* Hero *as your Lordſhip awakening the* Age *about it, is likely to fill up the Number of* loſt things; *and it is the* New Engine *that ſo much exceeds all formerly uſed for the eternal preſer-vation of our* Royal *Rivers, by* deep-ening *them, and making them every where* Navigable, *and taking away all* Ob-ſtructions *and* Shelfs *in a very ſhort time. Sir* Martin Beckman, *the* chief Engineer of *England, and as I am in-formed the ingenious Sir* Chriſtopher Wren, *their Majeſties Surveyor Gene-ral, have given their approbation there-of; and as likewiſe did King* Charles *the* ſecond, *who was highly pleas'd there-with, and declared after he had ſeen the working of the* Engine, *which in his Ma-jeſty's preſence took up about a Tun and an half in little more than a Minutes time, that he was perfectly ſatisfy'd it would anſwer the end propoſed; and that by means of its working* horizontally, *it*

made no holes, but rather fill'd such as lay in the way of its working, and left the bottom of the River level as it wrought, whereby such inconveniencies would be avoided, as had happened from the common Ballaft-Lighters *making such great* Holes *in the River of* Thames; *and in which several of the Kings as well as Merchants Ships coming to an Anchor, had broke their backs.*

And his Majesty having been made acquainted that this Engine *being sent down below* Bridge *to* Berking-shelfe, *where is nothing but hard* Shingle, *and that after half an hours breaking ground, it took up at* 19 *Foot deep, about two Tuns in a Minute and a half, during the whole time it wrought, he said thereupon,* That he thought there was no way practicable for the deepening the River of *Thames*, and removing Shelfes therein, but by this Engine.

This Engine *was* invented *by Mr.* Bayly, *an excellent Engineer, and much cultivated and improved to its perfection by the great* Expence *of Mr.* Joseph Cotinge.

King Charles *the* 2d. *so often going down*

down that River *in his Barges and* Yachts, *took occasion thereby often to consider the State thereof, insomuch that upon a publick* Hearing *in* Council, *that the* Lord Mayor *and* Aldermen *had upon their Complaint against Patents that* straiten'd *the* River, *and licenced* Encroachments *on it, he took occasion to speak it openly, that* the River was shallower before his Yard at *Deptford* by three Foot since his Restauration, and that if it should be but a Foot shallower there, his Ships that did ride at Anchor there would be spoiled.

But I have heard Mr. Shishe, *the* Master-builder *there, and likewise Sir* Phinehas Pett, *who was formerly Master-builder there, and afterward at* Chatham, *averr, that the* River *is there very near* four Foot, *if not altogether,* shallower *than it was at that King's Restauration; insomuch that their Majesties Ships there (as likewise in the* River *of* Medway *at* Chatham) *do* ground *about* four Foot *before they have* Water *enough to* wind *up with the* Tide *of* flood, *the which doth very much strain and wring them to their great prejudice, and that* if

there be not a ſpeedy courſe taken to remove ſome Encroachments, and prevent all future ones, and the farther ſtopping up thoſe Rivers with ſullage, thoſe two Royal Rivers will be ſpoiled, and in a ſhort time uſeleſs for Capital Ships riding therein, and the Crown be put to immenſe Charge in purchaſing of ground for other Ship-yards, and in making of Docks and Store-houſes, and building new Dwelling-houſes for the Officers of the Yards.

I remember, viſiting my worthy Friend Mr. Brisband, *who was Secretary to the former* Lords Commiſſioners for the Admiralty, *he entertain'd me with the ſight of many* Papers *in his* Office *that related to the Applications that had been made by the* City of London *to that* Board, *for the preſervation of the River of* Thames, *and one of them was a Paper of the City's* Reaſons *againſt the* Patents *for* Licenſing *Encroachments, and ſtraitning that River, and which ſeem'd to me very* weighty, *and drawn with ſuch great care and pains, that what* Councellor *ſoever drew them, I am ſure he deſerved a very large Fee from the City,*

City; and out of which I noted *down this Passage, namely,* That if that River were spoiled, the great Trade of *England* would be transplanted, not to other Sea-port-Towns in *England*, but to Forreign Parts. *Those* Reasons *mentioning* Patents *of the* Soil *to the low-water-mark on both sides the River, inferr,* That without speedy care taken, the River will be so straiten'd as to become thereby not only useless, but even hurtful to Shipping, by a violent and rapid course of the Tide that will then necessarily ensue: *And the City therein Complains of a* Lease *made of a great part of the* Soil *of the* River, *and that* the right of the disposal of the Shoar of the River, or the Conservatorship thereof, may by survivorship accrue to a Colour-man in the *Strand.*

Mr. Brisband *informed me, that those* Commissioners *of the* Admiralty *as well as the* Lord Mayor *had taken a great deal of pains in the preserving of the* River, *and that it was* incumbent *on* both *their* Offices *so to do; for which purpose he shew'd me a most* judicious *and learned* Report *made by the* Judge *of the* Admiralty,

miralty, *wherein it was said, That* the Admiral is by his Office and Patent not only *Custos Maritimarum partium*, but *Custos portuum & Conservator Fluminum infra fluxum & refluxum maris*; and that he is by his Patent empowered to make Sub-conservators, and hath by the Statute of *primo Elizabetha* a concurrency with the Lord Mayor of *London* in the Conservatorship of the River of *Thames*, and that the Shoar of the River is a part of the River, and ought not to be held by private Persons, as of their own right, but by those Conservators in trust for the Government.

And in fine, *that* Secretary *acquainted me, that there was to be a* Survey of *the* River *and the* Encroachments *on it to be made by* Trinity-house *and* Navy Board, *with the assistance of* Captain *Collins* the King's Hydrographer: *And I have since seen a* Copy *of that* Survey *made accordingly, and great pains was therein taken. The great pleasure I have taken in going down that River in Boats and Barges, made me always wish well to the State of it; but the sight*

of the Papers before mention'd, inclined me to account it a Patriotly *thing to promote its preſervation by all the means I could, and gave me occaſion to reflect on the great* Wiſdom *and Care of the* Publick *that appear'd in our* Anceſtors, *when they made the* Admiral *and* Lord Mayor *the* Conſervators *of it; after the example of the old* Romans, *as* Gryphiander *in his learned Book* de Inſulis, *p.* 430. *quotes ſeveral places out of the* Civil Law, *to ſhew, that they appointed their* Hydrophylacas, *or* Conſervators *of their great* Rivers, *and deliverers of them from being chonked up with* Annoyances *and* Shelfes; *and he there* p. 441. *cites* A. Gellius *for the* ratio retandi fluminis, id eſt, purgandi à Virgultis, arboribuſque in alveo Natis, ne impedimento ſint navibus, *practiſed by them: And he ſaith, that* ſimili verbo returandi uſus eſt Nonius quod eſt obturando contrarium, *Turneb.* l. 28. *adverſ.* 12. *And then ſpeaking of the* Engines *they uſed to that end, he ſaith,* In quem uſum Inſtrumenta hydrautica deducendis, hauriendiſque aquis inventa ſunt, de quibus Vitruvius, *l.* 10. quem explicat

Turne-

Turnebus, *l.* 2. *adverſ.* 22. Gothof. *in l.* 4. *c.* de Excuſ. Mun. *l.* 10. Dalecamp. ad Plin, *l.* 7. *c.* 37.

Thoſe Engines *are long ſince gone among* loſt things: *Nor do I think we need wiſh any other* Engine *for the purging the River of* Thames *from Obſtructions, than this I have referred to: And according to the common Obſervation of* Providence *taking care to ſend both new Diſeaſes and Remedies into the World in the ſame Conjuncture, and often from the ſame place, (as for example the* Lues Venerea *and* Guacum, *and* Saſſafras *from the* Weſt Indies) *it was worthy of its care for* England, *that at this time, when this our* River, *on which depends the* Fate *of our* Nation *is labouring under the moſt* critical *ſtate it ever knew, and is ready to be deſtroy'd, to offer us ſuch an* Engine *for it's being reſtored to ſuch a good Condition of being Navigable, as its* Conſervators *can wiſh.*

My Lord, *There is one thing that hath cauſed moſt horrible ill effects to this* River, *and which I have met with no Man who hath obſerv'd, and therefore*

it

it is fit it ſhould be known; and that is the Fire *of* London: *For every* five Yards *of* Pavement *a load of* Gravel *is uſed, and a great part of this* Gravel *lyes ſo looſe, that by the force of the Rain it is frequently driven into the* Sewers *and the* Thames: *And every* Pavement *raiſeth the* Street *paved* two Inches *at leaſt; but the* burn'd *part of* London *is at a* Medium *four* Foot *higher: And ſo I account that by the* Fire *and* Rebuilding *of* London, *more* Gravel *and* Soyl *hath gone into the* Thames *than perhaps will again in the next three hundred Years.*

Some who are intereſted in this Engine, *have ſaid, that by it the* Bar *of* Dublin *might be taken away; but I have heard that that is a* rocky *Barr; and if ſo, ſuch effect of the* Engine *is not to be expected: But that ſuch* Shelfes *ariſing in our River from the* Gravel *and* Sullage *that are waſh'd into it, may with eaſe be removed by it, is not to be doubted.*

This River *glides along with a much more clear and gentle ſtream than the River of* Severn; *and the Cauſe of the* clearneſs

clearneſs *of its Water, is its running* [illegible] *a Gravelly Valley, and over a clea Ground: And the great* winding *of th River, which locks in the Water tha it cannot make that haſte down to th Sea that it would, and the low-lying* [illegible] *the* Head-ſprings *of it, from whence ther is but an eaſie deſcent to the Sea, an the two chief Cauſes of the gentleneſs o its Current: It may be here remarke that this eaſie deſcent of the Waters t the Sea-ward, is another reaſon why th* Tide *flows up ſo high into the heart o this River; for the more ſteep the Ri ver is, the leſs able is the Tide to force its way up into it. Swift Rivers hav always their Heads lying high, or their Courſe direct, or both.*

Since I have been (as I may ſay) a Student *of this* River, *I have took oc caſion to pitty thoſe who look on the ſtrange* ſhifting *of* Tides *in this* River *as a great* Prodigy, *becauſe happening ſeldom: But I think the Cauſe of the* ſhifting *of the* Tides, *is only the over-bearing of their Courſe, when they are at their ſlackeſt, by a* Northweſt *Wind, which is the moſt powerful adverſary they can have on our*

Coaſts:

Coasts: For if a slow Ebb be encounter'd full in the teeth with a hard Storm, what can follow but a return of the Tide back again? And if the Northwest Wind either abate its fierceness, or shift into some other quarters, as the South-west or North-east for some short time, and then either return to its former place, or resume its former force, and do this once, twice, and again (which we know is not inconsistent with the Nature and Custom of the Wind off at Sea, thô at Land its wanderings are not altogether so sensible) we may easily believe (seeing so plain a reason for it) that there will be a playing of the Tide too and fro, and several Floods and Ebbs succeeding one another in a few hours space. My Sentiments in this place are those of the Author of Britannia Baconica. It was the Prædiction of Campanella, that Venice should at last be destroy'd by Oblimation, that is, by the Sullage of its Waters that should spoil their being Navigable. And Gryphiander in his Book before mention'd, hath a great deal of curious Learning, to shew what famous Rivers in the World had been destroy'd by Ob-

Obſtructions : He in p. 448. *cites* Ov *for his* ——— Vidi factas ex æquo terras. *He in* p. 177. *making the thr* conſtituent *Parts of a River to be* W ter, *the* Banks *and* Channel, *conſid the* Mutations *incident to them all, a in* p. 460. *ſaith*, Ravenna Italiæ urb ab Auguſto Cæſare portu manufact aucta, nunc pro flumine ſpacioſiſſim hortos oſtendit, malis plena, ſed d quibus non pendeant vela ſed pom Ita Patavij, Aquileiæ, & alibi latiſſim nunc jugera ſunt, ubi olim claſſiu ſtationes fuerunt, *&c.* Leowerdia, Bol werdia, aliæque Friſiæ urbes olim m ritimæ, nunc integro milliari a Ma receſſerunt : *And then ſpeaks of oth excellent* Harbours *there deſtroy'd* Oblimation *or Sullage. And in* p. 17 *he hath a great deal of excellent Learn ing much to this purpoſe, and ſaith* Quod ſi perpetua ſit fluminum mutatio videtur iple Deus imperij & provinci terminos mutatos velle, qui ob han cauſam Moabitis minatur, fluvium ip ſorum Nimrim exſiccatum iri, *Jerem* 48. *v.* 34. *Pſal.* 107. *v.* 33. Atque ho experientia confirmat. *De quâ* Lucia

in Charon. Atque urbes tanquam homines, & quod magis eſt admirabile, etiam univerſi Fluvii evaneſcunt. Inachi enim nullum Argis extat veſtigium. *Seneca* in *Hercul. Oetheo.*

Mutetur Orbis, vallibus currat Novis
Iſter, novaſque Tanais accipiat vias.

Inde factum cum ex fluminum inſolitis mutationibus præſagia ſumerentur de mutationibus imperiorum, ut flumina ipſa ab Ethnicis pro diis colerentur. *v. Natal. Comit.* lib. 1. Mythol. 11. Ita Nilus in Ægypto pro Deo cultus. De cujus preſagiis, *Seneca* l. 4. Nat. queſt. 2. *And there afterward ſpeaks of the* changes *of the* Channel *in the* Rhine.

He doth often inculcate *that* Notion, *That the* adminiſtration *of the* Banks *of* Rivers *is a part of the* Regalia; *and he in* p. 436. *quotes a great* Writer *of the* Regalia, *to ſhew that the Work of the* Inſpection *and* Conſervacy *of them is among the* Regalia: Sicuti etiam jus retardandi flumina, ripas muniendi, alveumque purgandi: *And there ſaith,* Hinc ſemper poteſtas ſtatuendi de aggeribus ad ſuperiores pertinuit. Ita Romæ remedium

dium coercendo Tyberi ex Senatus co
sulto Ateio Capitoni & L. Aruntio M
datum, *Tacit.* 1. Annal. & Constitut
est in eum usum certus Magistratus
Augusto Cæsare, *Sueton.* cap. 37. Ne
pe curator Riparum, & alvei Tybe
ut inscriptiones veteres habent, *Lip*
in Comment. ad Annal. Tacit. Tybe
us etiam quinqueviros constituit, *D*
Cass. lib. 37. Quos titulos usurpare
principes quidem puduit.

This great part of the Regalia, *nam*
ly, the Conservation *of all the* Roy
Rivers *of* England, *hath been always*
our Kings deposited in the hands of
Lord High Admiral of *England a*
Ireland; *and the trust thereof is b*
granted to our Admirals *in all their P*
tents, *and is* inherent *in their* Offic
and in all the Patents *of the* Viceadm
rals *of the maritime* Countyes *in b*
Realms, the Viceadmirals *are* expre
constituted Conservators *of all the* Ro
Rivers and Ports *belonging to those Co*
ties, as Mr. Brisband *inform'd me upon*
having perused the draughts of many Vic
admirals *Patents*; *I thereupon asking h*
whether those Viceadmirals did put th

pow

ver of being Conservators *of the Royal Rivers in execution; he told me that upon his having consulted some of the Offices and Officers in the high* Court *of* Admiralty *about this very thing, he could find no foot-steps of their having minded the Power of such Conservacy:* That he observ'd them diligent enough in that part of their Office that enabled them to receive several Admiralty Perquisites and Droits, of the which they were Collectors for the use of the Admiral, and to whom they often gave their accounts about the same; but that he never found in the Accounts of their Disbursments any thing inserted of a Penny charge they ever were at in the demolishing any Nusances, or removing any Shelfs in the Royal Rivers; and that the doing this being a thing of great charge, and they having no allowance of any Salary to support their Office, this Work was never expected from them.

Thus then have Eneroachers took what liberty they pleas'd, to make Purprestures in the Royal Rivers in the Countrey, and to build Houses thereon as seem'd good in their own eyes; and it hath there been,

as

as Gryphiander *saith*, p. 522. In C
cyræos propter impunitatem male
orum jocus est apud Eustat. in Dio
ἐλεύθερα Κορκυρα, χέζ ὅπου θελεις. *i. e.*
bera Corcyra, caca ubi velis.

But the Secretary *shewed me how t*
in the Finalis Concordia *of the* 18th
February, 1632. *before the* King
Council, *between the* Common-L
Judges and the Judge of the Admira
concerning Prohibitions, one Article
greed to, was, That the Admiral m
enquire of and redress all Annoyan
and Obstructions in all Navigable
vers beneath the first Bridges, that
any impediments to Navigation,
Passage to or from the Sea, *&c.*
no Prohibition to be granted in s
Case: *And from the forementioned* R
port *of the* Judge *of the* Admiralty
the late Commissioners *of the* Admi
ty, *it is plain that the* Lord high Ad
ral *in his high Court of* Admiralty *h*
under the eye of the Government, hath
riously acted in the Conservacy *of*
River *of* Thames; *for thence I no*
down what follows, viz. It can be m
appear by Records in the Court

Admiralty, that Licenſes have been gi-
by the Lord Admiral for the en-
gement of Wharfs, and that the ſaid
rt hath puniſh'd Perſons for not
ping them in repair, and Orders
e been made from time to time for
regular lying of Ships, by appoint-
how many ſhall ride a breaſt, &c.
d *the* Report *mentions, that one* was
ted with by Perſons concern'd in a
Patent, that he might be permit-
to take in ſome part of the Shoar
the Low-water-mark, *and that* ano-
had de Facto *agreed with them for*
ſumme *of* 20 l. for taking in 80
oot deep, and 100 Foot long of the
oar. *I have been by my Council at*
inform'd, that he hath ſeen various
Patents for granting away the Soil
the Shoar *to* private *Perſons, not on-*
in Middleſex *and* Surrey, *but in the*
unties of Kent, *and* Southampton, *and*
orfolk; *and that he ſaw a* Deed *under*
Hand *and* Seal *of the Colour-man be-*
re named in the City's Reaſons, *the*
ich Deed *was dated the* 22d. *of* Ja-
ary, *in the* ſecond *Year of the late*
ng James; *and in which he* Covenants

with

with some Sea-faring People, inhabit
by the Thames-side *in* Wapping,
neither he nor his Heirs and Ass
will build any House or Wharf ou
Soil between their Houses and Gro
and the Low-water-mark ; *which*
cessarily shews that he claim'd a Pr
of so doing if he would.

But at the Admirals *granting* Lic
ses *for the* Enlargement *of* Wharf
do not wonder, tho' yet there is no d
but that both the Admiral *and* L
Mayor *as* Conservators *of the Rive*
Thames, *have administred that bre*
of the Regalia candidè & castè,
with great precaution, with reports a
references to sworn Surveyors, *that*
River *would not be dammify'd by s*
enlargement of Wharfs, causing any
tys *to obstruct the course of the* Tid
carrying away the Sullage ; *a thing w*
generally happens by the Encroachme
that private Persons have presumed
make on the River.

And here I shall take occasion to
serve, that it is not only possible in so
Cases to take in some part of the Ri
without prejudice to it, but it is also
ba

hable that the taking in ſome places of the River would tend to the good of it. The general Rule is, that we may with ſafety to the River gain *upon the hollow Shore, but not on the* Convex *Shore, or where there are* Head-lands; *for then it would* change *the* Channel *and turn the ſtream into* Eddys; *as for example, If the* Cuſtome-Houſe-Key *ſhould be carried further, which is already brought to the Channel, it would be fatally miſchievous.*

It hath been by ſeveral skilful Surveyors *told me, that after the Fire of* London, *they upon the digging the foundation of the preſent* Cuſtome-houſe, *found that it was all ſuch as we call* made Earth, *and had been gain'd out of the* Thames, *and therefore it was (I account) with great Prudence, that the* Conſervators *of the* Rivet *conſented, that 'till they came to* deep *Water, it ſhould be gain'd in for the better Convenience of Navigation, that Veſſels might float at ebb as they now do at the Cuſtome-houſe.*

The ſame Surveyors *aſſured me that under* St. Magnus *Church they after the Fire met with an old Campſhot and Wharfing,*

Wharfing, gain'd from the Thames, a
that at the same time they were inform
that there were found Campshots ma
further from the Thames in digging
Cellars; and whence it may be infer
probably, that all Thames-street fr
Queenhithe downward to the Custom
house, was gain'd out of the Thames.

I give no hint of this, that any Pr
jector may take occasion from hence to be
Thames-street. God be thanked,
illegality of granting Forfeitures bef
Conviction is now out of fashion.
vexatious or prolling Patents are n
in the State of damnati antequam N
ti: And it must be acknowledged to
immortal praise of that true English-m
Sir George Treby, the Attorney G
neral, that he finding their Majes
Names surreptitiously used in the Pros
cution of such a Patent, did that gr
Justice to the Honour of the Governm
and to his own Character, as to caus
Cesset Processus to be enter'd in
Case.

When I consider the many Patent
both illegal and vexatious that passed
the Reign of King Charles the second

I call to mind that Maxime, *that* the King can do no wrong; *that is, he can in no* Grant cum effectu, *injure his People, but by ſome of his Miniſters in the Law paſſing it, and who in ſo doing may be ſaid,* Violare Sacramentum Domini Regis. *I believe that that excellent* Prince *did in his Nature wiſh well to the* Eaſe *of his People as well as his own, while by the fault of ſome of his Miniſters ſo many* Grants *ſurreptitiouſly did paſs of the* ſame conceal'd *Lands, and of* Purpreſtures, *and of Lands* derelicted, *&c. and when after* Compoſition *paid by the* People *to one Court-beggar, he ſent another to their doors; and when the ſuffering Populace, whoſe pretended* Forfeitures *were granted before* Conviction, *were ſo often tempted to cry out,* Quem das finem Rex magne laborum.

It was in that Reign excellently well ſaid by the Earl *of* Shaftsbury, *in his* Speech *in the* Exchequer, *at* Serjeant Thurland's *being ſworn a* Baron *there, viz.* Let me recommend to you, ſo to manage the King's Juſtice and Revenue, as the King may have moſt profit, and the Subject leaſt Vexation:

Raking for old Debts, the number
Informations, Projects upon conce
ments, I could not find in the elev
Years experience I have had in t
Court, ever to advantage the Crow
But such Proceedings have for the mo
part deliverd up the Kings good Sub
jects into the hands of the worst of Me
And Sir William Petty *in a* Manuscrip
I have seen of his, of the Trade of *Irelan*
for this purpose, taking Notice of the sev
ral Trades *by which People there subsi*
speaks of many there driving the Trade
Projectors, *and of such who make use*
the King's *Name, and the* Process *of the* Ex
chequer, *about concealed Lands, to spun*
Composition out of such as are willing
buy their Peace; and he having shew
how much the King *is damnified by tho*
Traders, *he saith very judiciously in th*
end, That this Trade doth not add an
thing more to the Common-wealth tha
Gamesters, and even such of them
play with false Dice, do to the commo
stock of the whole Number.

It is here therefore but just to take n
tice of the Prudence *of the* Trinity-
house, *in that after they had on th*

18th.

18th. of August, in the 15th. Year of that King's Reign, passed Letters Patents, not only of the Ballast of the River of Thames, but also of all the Waste ground, Purpresture and Encroachments, and Soil to it belonging; they soon found that it would engage them in Controversies with the City of London, and Seamen and Sea-faring People, and therefore surrender'd it, and the Surrender was enroll'd in Chancery the 9th. of December, in the 16th. Year of that King; and on the 24th. of June, in the following Year, they took out Letters Patents for the Ballast alone. But there were Patents passed of the same Encroachments Prior to the Patent of Trinity-house as well as after it; and it may be said, that on those after it, the Patentees came a gleaning, not only after the Reapers, but after the Beggars, since whatever Trinity-house receives, is only for the use of the Poor: However, the Trinity-house in taking out that Patent for Encroachments on the Thames, was made use of afterward as an Example or President in that Reign, for other Courtiers Petitioning for a Grant of the En-

croachments *on the Rivers* Royal *in t*
Out-ports *through all* England; *and t*
Petition referr'd found a favourable R
port *from one of the King's Council*
Law, but was ſtopp'd *on the* Lett
from all the Sea-port Towns in *Engla*
to oppoſe it, as likely to be troubleſo
and vexatious *to the* People, *and*
which Letters *I have ſeen the* Abſtract
I thank God for his inclining me
valne that habit *of mind, namely, of*
giving any man the leaſt Offence to g
the greateſt profit to my ſelf, equal w
my Life; *and as thoſe* divine *words*
Tully *ſhew he did with his*, viz. No
enim mihi eſt vita mea utilior, quam
animi mei talis affectio, neminem
violem commodi mei gratiâ, *lib.*
Offic. *And were I commanded to wri*
the Hiſtory of the Reign of any Prince
and therein in proper Colours to delinea
any of the Miniſters at Law to him wh
violated the eaſe of his fellow Subjects, b
the illegal *paſſing of* Grants *of* Forfe
tures *before* Conviction, *I ſhould tran*
mit his Character to Poſterity, in th
words of Vir natus ad corruptiſſimum
iſtius

lius sæculi Genium: *But the* Genius *of the* Age *is now for the making it self wise by its* ſpewing up *ſuch Patents: And the benefit the People find thereby, doth in a modeſt Computation outweigh all the Taxes they pay to the Government.*

The Magiſtrates of our Metropolis *are now eaſed from the labour of going in their* Formalities, *and with a* Parade *of City-officers attending them to* Whitehall, *to ſeek relief as formerly in the Reign of that Prince.*

And I may for the Edification of the Citizens of our Metropolis *in Loyalty, fairly take occaſion here to mind them, that when (as the Story is in* Howel's Londinopolis, *p.* 19.) *King* James *the firſt, being diſpleas'd with the City of* London *for their refuſing to lend him Money, told the* Mayor *and* Aldermen *attending him, that he would remove his Court, and the* Tower *Records, and Courts of* Weſtminſter-Hall *to ſome other remote place; and an* Alderman *then ask'd him,* if he would remove the River of *Thames? that if the* Alderman *thought that an* impoſſibility, *he was cer-*

tainly fat gone *in* Capon-broth.

For upon a discourse I had with a [illegible] *skilful* Surveyor, *on the occasion of my* [illegible] *ing him that I thought whoever bargain'd away that part of the Shoar that was before mention'd*, viz. 80 *Foot* deep, [illegible] 100 *Foot* long, *for* 20 l. *sold* Robin Hood's Penny worths *of it, his Measure agreeing with mine therein, and that many a Man would have given* 500 l. *for the same; I found on the Result of our Conference how the* Crown *might* grant *away by a* Moity *of the River of* Thames, *namely, the* Shore *to the* Low-water-mark *on both sides, (and which would in effect destroy the whole River as aforesaid) and gain the value of four Aldermens Estates by it.*

For thus his Calculation *was*, viz. *to shew that whoever gave* 500 l. *for it, would gain* 200 l. *by the bargain.* To go into the *Thames* 100 Foot long below Bridge, will cost a Man 300 *l.* with the slighter sort of Wharfing. If he goes 80 Foot deep, he hath it fill'd for nothing with rubbish; so then he gives 500 *l.* and giveth 300 *l.* more for the charge of his Wharf: And he may gain

200 *l.*

200 *l.* by the bargain by the ground-rents, thus, *viz.* He may build forward and backward on the Premiſes, and may compute the ground-rent by 6 or 7 *s.* the front Houſes *per* Foot, and 2 *s.* 6 *d. per* Foot the back Houſes; ſo then there being in a Mile above 5000 Foot, he will gain in one Mile 50 times 200, that is, 10000 *l.* and the like on the other ſide; and ſo proportionably for another Mile on both ſides; *Quod erat demonſtrandum.*

There were by the appointment of King Charles *the* ſecond *two* Surveys *made of the* River *of* Thames, *the one of the ſeveral* depths *of the* River *in its parts below Bridge, perform'd with great Care and Skill by that excellent Mathematical Perſon, Sir* Jonas Moor, *and a* Copy *of which I can direct the* Conſervators *of the* River *where to obtain for an inconſiderable Charge.*

The other was a Survey *of the* Encroachments *I before referred to, perform'd by the* Navy-Board *and* Trinity-houſe, *with the* aſſiſtance *of Captain* Collins, *his Majeſties* Hydrographer, *and wherein I ſaid great pains was taken;*

and a Copy *whereof is herewith publish*
for the use of the Conservators *of the R*
ver, and I can direct them to Capt
Collins *his most accurate* Draught *of t*
River, *and most necessary to be had*
them: And he in my judgment deser
to be well rewarded with some ackno
ledgment by the City for the great Pa
taken, and Skill *by him shewn in th*
Draught, *tending to the preservation*
their River: For he hath thereby laid
everlasting Foundation *for the easie a*
certain Prevention *of all* future *Encroach*
ments on the Thames, *and which may*
this way, and I believe cannot possibly
effected by any other; *namely, if th*
Lords Commissioners *for executing th*
Office *of the* Lord High Admiral *shall a*
point the Marshal *of the* Admiralty, *o*
some other Person, and the Lord Mayo
appoint his Water-Bailiff *at the* mend-
ing *or* repairing *of any* Wharf *upon th*
Thames, *to see a* Stake *stuck down, be*
yond which the Repairers *of the* Wharf
shall not proceed; and both of these Of
cers shall be order'd to demolish immedi
ately whatever shall be added beyond such
Stake. Captain Collins *his* Draught *doth*

suffi-

ſufficiently ſet forth how far the Encroachments *went that were made before the* Month *of* October, 1684. *the Month is or about which he gave in his Draught, and to which this printed* Survey *refers.*

Upon my conſulting the Authors that write of the Regalia, *to know their ſenſe of the Office of a* Conſervator, *I found this* definition *of it there,* viz. Conſervator eſt qui ſine judiciali examine jus aliquod publicum tuetur. *Nor is there any* moot-point *in our Law that need divert our* Conſervators *of the Royal Rivers from the immediate demoliſhing of* Nuſances, ſine judiciali examine.

For as little as I have convers'd with Law-Books, I find * *that* a Nuſance once erected may be abated by any Body, and that before prejudice receiv'd, and that it cannot be granted by the King, nor continued by the King's Grant or Pardon.

* 1 Crook, 184. James *and* Haywards *Caſe.* Coke 5th. *Report.* 101. Penruddock's *Caſe*; *and* 9th. *Report.* 53. Bettons *Caſe, cum multis aliis.*

And therefore when any one buyes a Nuſance, *ſay I,* Caveat Emptor: *I wiſh that all* Mercy *may be ſhewn to thoſe who have formerly encroached, and even to their old Encroachments, as may be*

without Cruelty *to the* River. *But I am inform'd that that merciful Prince, King* Charles *the* 2d. *gave* Order *to the* Lord Mayor *for the demolishing some particular* New *Encroachments that were very* prejudicial *to the River of* Thames. *He well knew that* two *parts of* three *of the* Customs *come to the Crown from the* Port *of* London: *And no doubt but the consideration of that, as well as the* Nations *concern of his Subjects, inclined him to endeavour the preservation of that River by the most effectual means; and he being so often upon the River, knew well that it would* bear *no* more *Encroachments, being particularly in the* Pool *so full of Vessels upon the coming in of the* Coal Fleet *there, that a Boat can hardly pass. He was sensible that the great straitness of the River already enforced the Conservators of it to permit more Ships to ride* a breast *there than had been formerly allow'd, and the which might produce the danger of their firing.*

His Majesty and all his People, being representative *and* diffusive, *had been long sufficiently acquainted with the Doctrine of* Nusances, *since the* passing

the Act *against* Iriſh Cattel, *and that a* Patent *for a* Nuſance *was not worth its weight in burnt Silk: And he hath been often heard to ſay, that* he would damn all Patents that damned the River; *and that the granting of things to the* Low-water-mark *muſt needs be* vexatious; *for that the* Neap-tides *and* Spring-tides *being ſo* various *at different times of the* Month, *and different times of the* Year, *beſide all variety of Wind and Weather from abroad, the great uncertainty of ſuch Grants muſt make perpetual diſturbances among his Subjects; and that if any preſumed to take in the River to what may ſeem the* Low-water-mark, *that then Ships* lying *by the* Walls *would encreaſe the* Mudd *there, and add to the dirt thrown in, and that that might be built on too, and ſo the River be annihilated. And he being inform'd that the Perſon who had made that Encroachment ſo prejudicial to the River, and which he purchaſed for* 20 l. *was only* Fined *by my* Lord Mayor's *Court of* Conſervacy 5 *l. for it, was reſolved to have it* demoliſh'd, *both for the good of the* River, *and to* terrifie *Encroachers for the* future;

for

for that he well knew the demoliſhing of that one Encroachment *would ſpoil the* Market *of ſelling* Nuſances *for ever.*

Nor is it to be wonder'd at, that his Majeſty *was ſo* thoughtful *and reſolute about the preſervation of his River of the* Thames, *ſince the Care of ſome* Royal *Rivers, not ſo conſiderable as that, have been known to take up ſo much of the time of the* Council-Board, *when they were much endanger'd by Obſtructions and Annoyances. I ſhall here take occaſion to mention what I find in Sir* Julius Cæſar's Manuſcript Collections *of Matters of* State, *that after King* James *had granted the* Conſervacy *of the River of* Tyne *to the* Mayor *and* Burgeſſes *of* New-Caſtle, *Complaints were brought to the* Council-Board, *of the great* Decay *of that River; whereupon on the* 29th. *of* January, *An.* 1613. certain Articles were order'd to be put in execution for the remedying the Abuſes complained of: And it appearing that that River was in ſuch eminent danger of being deſtroy'd, if a very ſpeedy courſe were not taken concerning it, the Council order'd that Sir *Julius Cæſar*, and Sir

Daniel

Daniel Denne, one of the Judges of the Admiralty, with the assistance of the *Trinity-Masters* of *London*, should draw up additional Articles to be joyn'd with the former, for the effectual Conservation of that River: *And one of them was*, That some truly trusty substantial Men, Burgesses of *New-Castle*, be appointed to View the River every Week, and to make Oath of the abuses done to the same; two of them to be Masters of the *Trinity-House* of *New-Castle*, and they to have no Coles, nor Mines, nor Ballast-shores, and who might be thought not concern'd for their own profit in casting Sullage into that River.

The Government *then thought not fit to make any Men* Guardians *of the Soil of that River, who had a pretence by Patents to* inherit *it.*

In short, when the Sun *is just come into its Winter-*Tropic, *the* dayes *begin to lengthen, and not 'till then; and when things were at the* worst *with the River of* Tyne, *they did then begin to mend: And the Wisdom of the Government shew'd its* Dominion *over all the* Starrs, *whose*

whose influences threatned that Royal R
ver : Dictum, factum; *and that R*
ver *is preserv'd to this day, and so I h*
with Gods help will the River of Thame
and all our Royal *Rivers be for ever.*

It was the saying of Maximilian t
first, Deus æterne nisi vigilares qua
male esset mundo, quem regimus e
miser Venator & ebriosus ille Julia
The Viceadmiral *of the* County, *and t*
Mayor *of* Newcastle *were in that Co*
juncture drowsie Conservators *of th*
River; *but* Divine *Providence was th*
awake to preserve that great useful R
ver, and to awaken the Government t
take those Measures for its preservatio
that were necessary, and suitably to whic
a fac simile *might easily be taken on o*
casion for any other of our Royal Ri
vers.

There is another of the Royal *River*
where the great Concern of Navigation
did so worthily employ the time of th
Council-Board *in the Reign of King*
Charles *the* first: *For one* Morgan *ha*
ving built a House *at* Crockyern-Pill,
in the Port *of* Bristol, (*and in which*
place Posts *had formerly been erected,*
for

or Ships *and* Barks *being faſten'd to him*) *the Lords of his Majeſties Council upon a Complaint of that* hindrance *to* Navigation, *made an* Order *that* Morgan *ſhould* demoliſh *and pull down that* Houſe, *that ſo Poſts might remain there as formerly, for the faſtening of* Ships; *as may appear by two ſeveral* Orders *made at* Council-Board, *the one bearing* date *the* 11th. *of* June, *An.* 1670. *and the other the* 29th. *of* October.

And if any private *Perſon may* abate *a* Nuſance, *even before prejudice receiv'd, none need make it a Queſtion whether the* King *or his* Privy Council *may, or Perſons by them Commiſſion'd ſo to do.*

Becauſe (*as we ſay*) *that which is every body's work is no body's, for that reaſon the* Law *hath entruſted that power of* abating Nuſances *in the* Royal *Rivers to the* Lord High Admiral, *as their* Conſervator, ex Officio; *and here for the doing that in the River of* Thames, *the* Lord Mayor *hath been admitted to that truſt; and it is* veſted *in* both *of their* Offices, *both by* Grant *and* Preſcription, *according to that* diſtinction *ſo often uſed among*

among the Writers of the Regalia, c
mulativè *but not* privativè ; *that is*
ſay, by the accumulating *the power*
Conſervacy *both to the* Lord Admi
and the Lord Mayor, *neither of them*
deprived *of it. Neither would either*
deprived *of the exerciſe of their* Pow
of demoliſhing Nuſances, *if the* K
ſhould grant a Commiſſion *to many o*
particular Perſons ſo to do : Nor
would the Commiſſionating *of* many *o*
ſuch Perſons deprive *the reſt of their ſ*
low Subjects of their right ſo to do.

And here it is obvious *to be ſaid by t*
way, that thô a Patent *that pretends*
grant *Encroachments or* Nuſances *is voi*
yet a Patent *or* Commiſſion *to throw the*
down is moſt certainly very legal. *B*
yet if any Man were ſo publick-ſpirite
as without a Patent *to attempt a thing ſ*
beneficial *to his Countrey, he would*
able to effect it with as much readineſs a
that honourable *Perſon, who hath on ma-*
ny Accounts deſerv'd ſo well from his Coun-
trey, the Earl of Craven, *without* Patent
or Commiſſion, *or a* Parade *of* Officers
and gilded Maces *going before him, hath*
been long obey'd in the quenching of Fires.

My

My Lord, *I believe the* Engliſh *Nation is* doubled *in populouſneſs, ſince the antient Methods were firſt uſed of truſting the Care of* Conſervacy *of the* Royal *Rivers in the Countrey to our* Vice-admirals, *whoſe ſo long* Non-uſer *of their power relating to the Encroachments on them, hath ſufficiently appear'd by the many Patents of thoſe Encroachments in the ſeveral Countreys granted in the* Reign *of King* Charles *the ſecond, and the which hath beſide the inconvenience of the ſtraitning thoſe Rivers, produced another to our Navigation, namely, the Creating much trouble by innumerable Law-ſuits to our* Navigators, *who generally inhabit by the ſides of thoſe Rivers, and where their Ships uſe to lye: And it is pitty but that ſome Clauſes ſhould have been inſerted in thoſe* Patents, *to direct a different way of* Proſecution *in their Caſe from that of other Subjects, and that unleſs very* enormous *prejudice had come by their* Encroachments *to the* Royal *Rivers, the* Seamen *might not have been put to it to give Compoſitson-money for the* licenſing *their Nuſances. It hath been truly obſerv'd*

ſerv'd by a late Writer, That Seam
are eaſily tempted to ſeek good Ent
tainment in other Countreys, if they fi
it not in their own, and that they
apt to change their own Quarters, a
embarque in Forreign Service, ſom
times upon a Capricio of their reputa
themſelves diſobliged at home, and
other times on their expectance of b
ing better uſed abroad. And in a Re
monſtrance from *Trinity-houſe* to t
Earl of *Nottingham*, Lord high Adm
ral, it was certify'd by them to h
Lordſhip, that in a little more than
Years after 1588. the Shipping a
Number of our Seamen were decay
about a third part.

It ſeems by the wiſe Conduct *of t
Government then, our* Sea-men *and the
numbers were carefully* enroll'd.

But ſo indulgent was Queen Elizabe
to the Seamen *in her Reign, that we fi
in the* Act *of* Parliament, 35 Eliz. *c.*
An Act for reſtraining of New Buil
ings, *a particular tender regard is ha
to the* Seamen; *for there it is ſaid*, Pr
vided alſo notwithſtanding any thing
this Act, it ſhall and may be lawful f
ever

very ſuch Mariner, Sailor, *&c.* as ſhall be allow'd by the Lord Admiral, and the Maſters and Company of the *Trinity-Houſe* for the time being, in writing under their Hands and Seals to continue in his habitation in any Houſe that hath been built ſithence the ſaid Proclamation, near to the *Thames*-ſide, ſerving only for the habitation of ſuch Mariner, and not to be uſed for any Victualling-houſe, nor for any Houſe for any Merchandize, *&c.* and likewiſe that any Mariner may hereafter build any Houſe for ſuch purpoſe, and for no other, on or near the *Thames*-ſide, ſo as it may be diſtant from the very Wharf or Bank thirty Foot, ſo as People may paſs between the ſaid Houſes, and the ſaid Bank and the *Thames*, &c.

I ſpeak not this as if I would have any Mariners make any new Encroachments on any of our Royal Rivers, eſpecially on the Thames, *which is already ſo much ſtraiten'd: But I urge it to ſhew how the* Wiſdom *of the Government then did make it (as I may ſay) a* fundamental *Rule for the Preſervation of the* River *of* Thames, *that even while encouragement*

ment was providing for the Sea-men, (
Walls of the Kingdom) yet Houſes by
Thames *ſhould not be permitted, but*
the Allowance *of the* Admiral, *the gr*
Conſervator *of all the* Royal *Rivers,*
the Trinity-houſe, *firſt had under th*
Hands and Seals. Several of the Me
bers of the Trinity-Houſe *dwelling by*
Thames-*ſide below Bridge, cannot bu*
they go up and down by Water, take
tice of the Encroachments as they are
king, and which of them will emine
prejudice the River, and which not,
ſo are the more proper to be conſulted
the Caſe.

And from hence we may Collect th
great Document, *and ſo neceſſary to*
thought of again *and* again, *by the Co*
ſervators *of our* publick *Rivers, name*
That whatever alteration is made
them, by building on them, thô ne
ſo little, ought to be with great Ca
and with the uſe of the *Conſilium pe*
torum, and not by the arbitrage of p
vate Patentees and their Executors,
by the Publick Conſervators, to wh
perſonal Circumſpection and Skill th
great truſt was always committed b

the Government; *the* Office *of the* Admiral *having never been granted by* Inheritance, *as ſome great Offices*, viz. *the* Earl Marſhal *and* Lord Great Chamberlain *have been.*

And there is another inſtance *of the* ancient *Care of the* Government *over the River of* Thames, *that is very* memorable, *namely, the excellent Inſtitution of the* Wardmote Inqueſt, *the which thing hath worthily made the Government of the City of* London *ſo famous all over the World.*

I have read the Articles of the Charge *of the* Wardmote Inqueſt, *that were in print in Queen* Elizabeth's *time, whereof the* 4th. Article *is*, Ye ſhall ſwear that ye ſhall enquire and truly preſent all the Offences and Defaults done by any Perſon or Perſons in the River of Thames, according to the intent and purport of an Act made by our late Sovereign Lord King *Edward* the 6*th.* in the High Court of Parliament, and alſo of divers other things, ordain'd by Act of Common-Council of this City, for the redreſs and amendment of the ſaid River, which as now is in great decay

and

and ruine, and will be in short time p
all remedy, if high and substantial P
vision and Help be not had with
speed and diligence possible, as m
plainly appeareth in the said Act of P
liament, and the said Act of Comm
Council of this City.

Here the most grave and substan
Citizens, are put to it by a premiss
Oath to stake *their Eternities, and*
effect to invocate *God, both as* Wit
and Revenger, *about their doing ri*
to that River *in their* Presentments;
I am sure the present State of it, be
conformable to the Words, *in that Ar*
cle relating to its great decay and
ine, *&c. is what they may safely sw*
in an Oath assertory.

Howel *in his* Londinopolis, *p.* 3
speaks of this Article *still continuing*
Presentments in the Wardmote
quest.

When the Government did ancie
order the Lord High Admiral *and*
Lord Mayor *to* espouse *the Interest*
this River, *our* Monarchs *did not*
sent to them, as one did who told a R
man *Emperor, he offer'd him a Lo*

...was Vidua & indotata. *As much ... it hath been (as I may ſay,)* widdow-... *and bereaved of that Care it ſhould ...ve found, while many now living re-...ember at leaſt a* fifth *part of it to have ...en taken in by* Encroachers, *it brings ... ſtill a very fair and plentiful* Dow-...r *to the* Lord Admiral *and* Lord May-... *The* Lord Admiral *hath been by it ...abled to ſupport the* Trinity-Houſe *by ...e* Ballaſt-Office; *and I in my Conſcience ...nk it well beſtow'd on them, that is ... ſay, on the poor* Seamen *whom that ...xcellent* Corporation *relieves thereby.*

The Chainage *of* Ships *belongs to the* Admiral, *and the right of the* Ferriage *over all Rivers between the* firſt *Bridges and the Sea is a Perquiſite of* Admiralty, *and the right thereof is* inherent *in the* Office *of the* Admiral; *and 'tis* notorious *that the* Right *of the* Ballaſtage *in all the other* Royal *Rivers of* England *belongs to the* Admiral, *as well as in the River of* Thames. *There is the Perquiſite of* Anchorage *in the* Thames, *as well as elſewhere, belonging to the* Admiral, *as are likewiſe many other* Perquiſites, *and that are enumerated in the* Admiral's *Patent.* *Nor*

Nor can any Right *belonging to t*
Admiral *be paſs'd by the Crown under t*
Great Seal *to any one but by the* Adm
ral's *Warrant to the* Attorney *or* So
citor *general.*

To the Lord Mayor *as* Water-ba
ly *and* Conſervator *of the* River
Thames, *ſeveral* Fees *and* Profits b
long: *And to that* Office *of* Conſervat
belongs *the* Office *of* Meaſuring Coa
Grain, Fruit, *in the* Port *of* Londo
with *the* Fees *belonging to it*; *and t*
Fines *impoſed in his* Court *of* Conſerv
cy, *or by the* Commiſſioners *of* Sewe
for Miſdemeanors that concern the Ri
ver; *and other Perquiſites, and in t*
which the Admirals *have long ceaſed*
intermeddle; *and not without cauſe, b*
cauſe of the great Charge incident to t
Lord Mayor's Conſervacy *of the Riv*
and particularly in matters relating to t
Fiſhery, *and the charge that attends t*
traverſing Indictments, and remov
them to the Kings-Bench, *as likewiſe t*
Charge of ſuing out Scire Facias's *to v*
cate the Grants of particular Perſons th
entrench on the rights of the Lord Ma
or's *Conſervacy, and which Charge th*
bu

have often ſupported without being there-in aſſiſted by the Lord Admirals.

I might inſtance in many paſſages in the reigns of our Kings long ago, concerning the Lord Mayor's *applying to the Government, when private Courtiers had ſurreptitiouſly obtain'd* Patents *that* incroached *in the* Conſervacy *of the River; as for example,* Edward *the* 4th. *having made a* Grant *to the* Earl of Pembroke *for* ſetting up a Weare in the River of *Thames, and the* Lord Mayor *applying to the King about it, obtain'd a* Scire Facias *to* vacate *that* Grant, *and vigorouſly proſecuted the* vacating *thereof to effect.*

And how in the two laſt Reigns ſeveral Lord Mayors *with great Induſtry and Charge proſecuted the* vacating *of Patents that they judged entrenching on the Conſervacy, that both by* Charter *and* Preſcription *belong'd to them, is known to every one: Nor will the unwearied diligence of thoſe Patriotly* Lord Mayors, *Sir* William Pritchard, *Sir* Henry Tulſe, *Sir* James Smith, *Sir* Robert Jefferys, *Sir* John Peak, *in thus ſhewing their Zeal for the* Conſervacy *of the* River,

be ever forgot, while that City keeps [illegible]
cords.

And they are ſtrangers to the Cha
cter of the preſent Lord Mayor, *both*
integrity and prudence in Political C
duct, and his Zeal *for maintaining*
known Rights of the City, who ſhall
that if he had been at the Helm of
Government of the City when they
he would not have ſteer'd the ſame Co
as the moſt active of them did, and
with ſuch a Courage as is worthy the
Sphere *of Magiſtracy he moves in.*
Coward (*ſaith one*) cannot be a g
Chriſtian, much leſs a good Magiſtr
Solomon's Throne of Ivory was ſuppo
ed by Lyons. Innocency and Integr
cannot be preſerved in Magiſtracy w
out Courage. Magiſtrates are g
Bleſſings, *Modo audeant, quæ ſenti*
if they dare do their Conſcience.

Mequæ te peperi ne Ceſſes Thorna tu

was the ancient Inſcription *of the* Brid
houſe Seal, *and which may give an*
caſional hint *to any Citizen of* Lond
advanced to Authority and Opul
th

therein, to wish well to the defence *of that* River *that hath so long* bred *and preserv'd the Riches of that City.*

I am here led to observe, how that River being pester'd by various Annoyances in the Reign of Henry *the* 8th. *and the Lord Mayor's Officers being made unfit, and hinder'd in the Conservacy of the River; the* City *apply'd to the King for a* Proclamation, *who accordingly issued out one in the* 34*th.* Year *of his* Reign, *strictly requiring,* That none should presume to resist, or deny, or impugne the Lord Mayor or his Deputies, in doing or executing any thing that might conduce to the Conservacy of the River, *&c.*

And methinks the Customary yearly *Solemnity of the New* Lord Mayor's *attended with all the* City Companies *in their Barges on the* Thames, *and there on that River above Bridge having their first* Scene *of Triumph, as they are going to* Westminster-Hall *to be* sworn, *should give them occasion to think often of that Rivers preservation in the following part of the Year.*

I am here led to call to mind a fatal danger that that River above Bridge escaped in the Reign of the late King, when some were so hardy as to offer him a Propositon, and in the way of a Project *to enlarge his Revenue by straitning the River, and by building another* Street *between the high and low-water-mark, from the* Bridge *to* White-Hall. *But tho' so great a* straitning *of the River there would not have been so prejudicial to the publick as lesser straitnings of it below bridge, where the great Scene of Navigation lyes, yet his Majesty with great judgment gave a peremptory denyal to the Propositon, for this particular reason, namely, that such an alteration in the River might perhaps produce an alteration in the Tide of Flood, and be the cause of its not flowing so many hours as it doth, and which effect too he thought the building of a* Bridge *at* Lambeth *(a Project that some offer'd to his Consideration) might produce, it being obvious that the Obstacle the course of the Tide meets with by* London bridge, *doth much occasion the Tide of Flood being the shorter.*

And

And if great Care had not been taken by the Trinity-house, *in the government of their* Ballaſt Lighters, *and ordering them not to draw up Ballaſt too near the Banks of the River, there would have been great danger of another accident that might have curtail'd the Tide of Flood; I mean by their coming nearer to the ſhoar than the ſafety of the great* Level *by* Limehouſe *will admit. In the ſame time that they can draw up one* Tun *of Ballaſt in deep Water, they may draw up* three *near the ſhoar. A* breach *in that* Level *did within theſe few Years coſt the Proprietors* 25000 l. *a* third *part of the value of the Land: And if a new greater breach came, perhaps it would not be repairable, and poſſibly cauſe the* Thames *not to flow up ſo far as it did, and yet doth. But any thing of this Nature we may well hope will be prevented by the excellent* Management *of the Ballaſt-Office, by the induſtry of that* Virtuous *and* Prudent *Lady, the* Lady Brooks, *who hath the* Leaſe *thereof from the* Trinity-houſe, *and hath taken much more Care of its being managed for the good of the River, than was took formerly.*

I forgot when I was just now consid-
ing the Affair of the Annoyances a
Streightning *of the* River *above Brid*
to mention it, that a Gentleman *of t*
Temple, *who has not been many Ye*
a Barrester, *told me,* He remembe
that since he was of that Society, th
River at low-water came up so far
to touch the Garden-wall; *and eve*
one knows at what great distance it is no
from the Wall at low-water.

My Lord, *I have here given yo*
great active thoughts the best entertai
ment I could upon our Royal *Rivers, an*
particularly on the Thames. *Great me*
are like the heavenly bodies that fin
much veneration but no rest, unless w
find a Salvo *for their having the latter,*
by saying what the Philosophers *do o*
the Heavens, that Movendo quiescunt.
And whoever will be just to your Lord-
ship, must acknowledge that you have
esteem'd your self most at your ease and
rest, while in the high Orb Fate has
placed you in, you have been most active
and busie in blessing the World with your
influences. Your Lordship need not be di-

rected

ted to that Moral *remark, that your vate good is included in the publick,* unquam Trigonum in Tetragono. *And as in Nature we see that all bodies by their own* proper *Center tend to the* Center *of the* Universe, *so they that know your Lordship, know it is natural to you by your tendency to your own Welfare and Happiness to endeavour to promote the Ease of your Countrey in all the wayes you can.*

Your Lordship is no stranger to what the Roman *Poet saith of* Cæsar,

——— media inter prælia Cæsar,
Astrorum Cœlique plagis, superisque
(vacabat.

And therefore if his great mind could in the heat of Battel find leisure to employ it self about the imaginary Circles in the Heavens, and which only salve *the* appearances, *I believe if presently after you had charged in a Battel, I had hinted to you some of the great matters before mentioned, that are as real as these three great Foundations of real Learning can make any thing, I mean, number, weight,*

and local motion, and matters on which the Salus Populi *doth absolutely depend, your* Lordship *would have given me the hearing. And having said this, I shall not doubt but that now you are by Providence brought to support the Crown and your Countrey, by the great Figure you make in the* Council *and* Parliament, *and in the peaceable administration of the Civil Government, your Lordship will therein be as vigilant for the publick as ever you were in War.*

Nor to a Soul *so refined as your* Lordships *could any War but what is in order to Peace seem eligible; and when in the Case of any degenerate stupid Members of Mankind, who are deaf to all Reason for their being happy, or suffering others to be so, you are call'd to* awaken *the World out of its* Lethargy *with the sound of* Drums *and* Trumpets. *But it is an easier and gentler way of awakening any of our Magistrates, whom you may judge to be sometimes drousie in the Administration of those great trusts reposed in them by the Government, that I here most humbly offer to your Lordships thoughts, and particularly as to the publick concern*

in

in the Conſervacy *of the publick* Rivers, *and the Care of which in this growth of the populouſneſs of our Countrey, and overgrowth of the abuſes done to thoſe Rivers, may well call for the* Superviſorſhip *of ſome particular Perſon or Perſons, who either being Commiſſion'd for their Conſervacy under the* Crown, *or the* Commiſſioners *of the* Admiralty *may really Conſerve them.*

Nor need the Vice-admirals *Commiſſions on this occaſion be alter'd. Let them be nominal* Conſervators *ſtill, and* real *ones too as far as they pleaſe. Nor need any the leaſt deduction be made from, or intrenchment on any* Fees *taken by the* Lord Mayor's *deputy Water-bayly or* Sub-Conſervators *for the* River *of* Thames, *as I find him* ſtyled *in that Book of* Howel, *where he* p. 35. *treating of the* State of the Lord Mayor, *ſaith,* He hath a Sword-bearer, Common-hunt, and Common Cryer, and four Water-Bayliffs, Eſquires by their Places; *whether he there makes* three *too many, I know not, I have formerly heard of* one *too many. But thô neither* Mayor *nor* Admiral *can erect a* New *Court of* Juſtice

without an Act *of* Parliament, *or* Letters Patents *from the Crown, yet common reason tells us they may make as many* Sub-Conservators *or* Deputies *for the* Ministerial *work in the* Conservacy *of the River as they please. And if any one publick-spirited Man were either by the* Crown *or* Admiral *entrusted with the Conservacy of the other* Royal *Rivers, he might for each of them employ what hands he pleas'd.* Quod quis per alium facit per se facere videtur.

According to the vigilance and prudence of the former Commissioners *of* Admiralty, *in effecting the before mention'd* Survey *of the* Encroachments *on the River of* Thames, *and likewise the* Draught *of the* River *by* Captain Collins, *the like* Surveys *and* Draughts *of all the other* publick *Rivers beneath the* first Bridges, *may in a Years time or thereabout be prepared, the which draughts of the respective Rivers being fairly set out in* Frames, *may usefully be hung up as Ornaments in a Gallery in the House of such general Conservator for the time being, and be left to his Successors to have the Custody*

ſody of. And to ſuch Draughts recourſe may eaſily be had by any of their Majeſties Miniſters of State, or Officers in the Admiralty Court or Navy, or by the Trinity-houſe, upon occaſion. Such Surveys and Draughts being skilfully and accurately prepared, and ſome Elbows of Wharfs and Jettys being taken away, whereby the ſides of the Rivers may as much as is needful come toward the ſhape of a right Line, the Courſe of the Rivers themſelves will begin to Cure them of their Sullage; and ſuch Eddys as caus'd the Water to ſettle with the mud formerly be prevented: And theſe Draughts of the Rivers ſerving as the Standards by which all future Enlargements or Diminutions of Wharfs or Banks may be guided, will make it appear as abſurd for Encroachers to break in upon them thus reform'd and regulated, as it doth to Clippers to incroach on our curious new Mill'd Moneys and the Letters about their Edges, and as abſurd for any to begg Patents from the Crown to take in the Lines of our publick Rivers, as the Letters of our Coyn.

And

And thus after a little diligen and reſolution employ'd in the firſt ſe ling of this work, the conſtant C ſervacy of all our Royal Rivers, wou be comparatively eaſie, the populace ſe ing that the Government was in earn in the thing, and as it appear'd to be the Conjuncture before mention'd, wh the Magiſtracy did rouze *it ſelf for th preſervation of the* River *of* Tyne.

Who would have thought that after th Survey *of the* Encroachments *on the R ver of* Thames, *and the Draught of the* River *by* Captain Collins, *they ſhould be no more minded than if ſuch a* Survey *had been made of the* Annoyances *of th* Rhine *or* Texel?

Would any one think that after the va pains taken by the Trinity-Houſe *in go ing down the River to perfect its Surve ſo many times, in the extremity of Win ter-weather, and many of them being* Ve teran *Seamen, thereby contracting dan gerous Colds, Coughs and Catarrhs, be cauſe the Government required the* Sur vey *to be made with all expedition; and after that excellent* Seaman *and* Hydro grapher, *Captain* Collins, *had in order*

to

to the making his Draught of the River exact, made ſo many weary ſteps in the mud of the ſhore, yet many Summers after Summers ſhould paſs without any thing brought to effect for the good of the River, or the abatement of one Cauſway or other Nuſance, and both Survey and Draught be no more regarded than an old Almanack calculated for the Meridian of Paris or Madrid? Nay, which is more, can it be imagin'd that Captain Collins, a Perſon of great integrity, ſhould relate it to another ſuch Perſon, That he within this Year or thereabouts, going to ſee the ſides of the River formerly ſurvey'd, and to find what effects the Survey and his Draught had there produced, that he there found Stone-wharfs built into the *Thames* for three or four hundred Foot in length, and from ten to thirty Foot in breadth; and that he found a great many other ſmaller Encroachments on both ſides of the Water, and ſeveral new Cauſeways, which in time would raiſe the Mud equal to the ſuperficies of the Cauſways; and that he acquainting the City-Officer entruſted with the Care of the Concerns of the River

River therewith, had from him inste
of thanks a ruffianly Anſwer? *yet th*
very words of the Captains *ſpeaking w*
Noted *down from his Mouth by the P*
ſon to whom he ſpake them. Thus is t
Caſe *of the Rivers* Survey *and* Aba
ments *of its Nuſances, like that in t*
Epigrammatiſt,

(pe
Eutrapelus tonſor dum Circuit ora L
Arraditque genas, altera barba ſub

His dilatory Shaving *occaſion'd a* Ne
Beards forth coming.

But that the Watermen *may have n*
cauſe to complain that they cannot Lan
nor take in their Fare, *if they may no*
have that uſe of the Cauſways *that th*
Survey *mentions as prejudicial, I ſha*
here ſay, that both their Fare and the
may be accomodated as well below Brid
as above, by the Uſe of a Truck *or* Boat
with Wheels *at the end next the Wa*
ter, to move too and fro as the Tide come
in or goes out, which may anſwer their
purpoſe.

And if thoſe to whoſe Care the Con
ſervacies *of the Rivers are entruſted a*
Depo

Depositaries, *may happen to tell your Lordship that they are not at* leisure *to mind the vigorous discharge of this trust*, Reply *may be had from the trite passage of King* Philip's *telling a Complaining Woman that he had no* leisure *to do her* Justice, *and on which occasion she said, that then* he should have no leisure to be King. *Most certainly he who receives a* Depositum, *obligeth himself to be at* leisure *to preserve it: And I never knew any Judge but who would find* leisure *to* ampliate *and* enlarge *his Jurisdiction, especially when he saw any Men find leisure to try to diminish it.*

There was one thing that seem'd to be of some moment for the discouraging any one from a belief of the likelyhood of any of the Encroachments *on the Royal Rights being shortly removed, or of the event of any Person of Honour or Quality's being likely to undertake to serve his Countrey therein; namely, the want of any* Fonds *to support the Charge of such Office. But as to which, it is obvious to consider that the Law is open to compel Encroachers to be at the Charge of* abating *their own Encroachments, if able to*

do

do it, and wherein ſuch eſpecially who ter the Survey *made* Encroachme *on the* Thames, *will deſerve little F vour.*

And in the Caſe of Inſolvents, t Encroachments *of* ſolvent *Perſons th ſhall by the* Conſervators *be permitted continue, as conſiſtent with the* ſafe *of the Rivers, may eaſily be made to bea that charge.*

I remember a Perſon employ'd by ſom of the late Kings Miniſters *to diſcour Sir* Robert Jefferys, *when* Lord Ma or, *about this Matter, acquainted that Sir* Robert *then moved it to t* Court *of* Aldermen, That a Committ thereof might be appointed to meet his Houſe with that Perſon, *and there offering it to their Conſideration, the ſenſe of thoſe* Miniſters, *that* Com miſſioners ſhould be appointed by his Majeſty to make moderate Compoſi tions with the Owners of ſuch En croachments as were not very prejudi cial to the River, and were to be con tinued, and the Charge of the demo liſhing the prejudicial ones might be defray'd out of ſuch Compoſition, and

that

hat he desired to know whether they d any thing to object against it. *The* ord Mayor *and the rest of the Com-ittee* unanimously *declared that they re very well* pleas'd *with the* Pro-ition, *and did* thankfully *embrace*

And no doubt but if the like way of Compositions were order'd for such En-croachments as are to continue in the oyal *Rivers in the Countrey, the* charge *the demolishing some there, and of the* gulation *of those* Rivers, *might not* ly *be thence* defray'd, *but a conside-rable summe of Money might be thence brought in to support the Charge of the Government, and that without any gain-saying or reluctance from the People, pro-vided that they might be deliver'd from the* vexatious *Prosecutions of the many Patents to private Persons for such En-croachments; to whom they have been in a manner forced to give Money to re-deem their* Vexation, *rather than out of hopes that they could buy a good Title for the continuance of their* Nusances. *And certainly the Condition of the* French *Subjects being so ill on the ac-*

count

count of their being forced to buy S
any Mens being harrass'd into the b
ing such insipid *things* (*or as I may*
ther say noxious) *as Nusances, is a*
compassionable Case. *This is hu*
offer'd to the Consideration of the Lo
Commissioners *of the* Admiralty,
order to their offering it to the Cons
rations of their Majesties, *or of*
House of Commons, (*who are the gr*
Inquest *of the Kingdom*) *or of the Ho*
of Lords, *as they shall see occasion.*
perhaps if by their Application, *a Cl*
may be inserted in some new Act *of P*
liament, *for the continuance of Peo*
Enchroachments that shall be compou
ed for by Commissioners *in the re*
tive Counties *named in the* Act, *or*
their Majesties, *they being by the L*
gislative power secured in their Ti
to such Encroachments, will no doubt
chearfully ready to pay near the full V
lue thereof.

The common Observation, *that Pr*
rogative in the Hand of the Prince
a Scepter of Gold, but in the Ha
of the Subject a Rod of Iron, *is app*
rently applicable to the Case of the Jubi
Sub

People will have, when freed from Vexations *by* Colour *of Law given by the* Proling *litigious* Inſtruments *ſo employ'd under ſuch Patents, who are uſually the* Fæx Populi, *and may well bring to mind the ſaying of* Solomon, A poor man that oppreſſeth the poor, is like a ſweeping Rain which leaveth no Food.

I have been inform'd from Mr. L. J. worthy Bencher *of the* Temple, *that the poor People were ſo miſerably* harras'd *by the* Agents *employ'd in the Lady* —ll's *Patent for* derelict *Lands, about* Forty *Years ſince, that the* Court *of* Exchequer, *burden'd with Complaints about* it, *Order'd, that* no Proceſs of the Court *ſhould be further* iſſued out upon it.

I do ſtudiouſly avoid the naming of Patents *or the* Patentees, *or any of their* Inſtruments *or* Agents, *and do not deſire to give our* Admirals *any trouble with reflections on ſuch, however yet in the courſe of my little reading in* Parliament-Records, *I find that many Perſons have been cenſured in* Parliament for taking out and procuring illegal and vexatious Letters Patents from the Crown. *The* Caſe *of Sir* Francis Mitchel

for

for his procuring a Patent *of* forfe
Recognizances *before* Conviction,
freſh in Memory.

Nor ſhall I here mention the Na
of thoſe Patentees particularly, who
multitudes *of the* Seamen *ſo much*
ble at Law by their Patents for Encr
ments, while they knew there were
Patents *in being for the* ſame *Encr*
ments, and that therefore no Action
then maintainable *by the* latter *P*
tees, and that they could have no
ſign by bringing their innumerable A
ons *againſt the* Seamen, *but to get C*
poſition *out of them.*

Nor ſhall I mention the Name
Waterbailiff, *who was reflected on*
Council *in the two laſt Reigns, for hav*
the Encroachers *on the* Thames *for*
Tenants, *and whom a late* Lord Ma
reproved very worthily on that acco

Nor ſhall I name a later Lord Ma
who inſtead of being a Conſervator
the River, appear'd as a Patron *of*
croachers, *by effecting it that a* Ri
leader *of the Encroachers ſhould be fi*
only a Noble *for an* Encroachment, *t*
in the Survey *of the* Navy-Board

Tri

ity-house *is particularly* branded
its dimensions *as* prejudicial *to the*
nes, *and his being suffer'd to* con-
that Encroachment; *and the which*
r his Lordship *was known to shew*
t the request of a Person who was
lame *reflected on in* The City Rea-
before mention'd, as an Encroach-
their Conservacy. The words
e wise are heard in quietness; *and*
refore desire not to ruffle *the* Cares
y of our Magistrates, from whom
redress of these evils may be hoped,
noise of the Names *of Persons. I de-*
hat they may please to look forward,
ackward, *and that at* things *rather*
Persons, & nequid detrimenti capi-
blicorum fluminum Conservatio.
d here it falls in my way to ob-
that supposing the Conservators
not think it necessary in haste to
any Nusances, or to effect the raising
Revenue for the Crown, or Fond
Office on the Encroachments, yet
the charge of the Office *before men-*
be competently supported out of Ad-
ty Perquisites, *either as they are*
y vacant, *or as they shall be; and*

such

such Perquisites *as to common re*
may seem most proper *to be apply'd*
publick *use, and as I before menti*
how the Ballast *was. The truth is,*
sidering how little the standing Fee
the Judge *and other* Officers *of the*
Court of Admiralty *are proportion'*
the great pains by them taken, and
in them repos'd, and for how muc
greater income than yet belongs to
nity-house, *that is so useful a recep*
as to the Charities to be bestow'd on
cay'd Seamen, *and their Widdows*
Orphans, and where they are to such
so much exact Care apply'd, I have
much troubled when I have heard of
miralty Perquisites *bestow'd formerly*
Courtiers and Voluptuaries, by whom
Admiralty Office *and* Jurisdiction,
the moral *Offices incumbent on the*
have not been promoted one jot.

But since the Nature of things
Call so loud for the speedy Settlemen
this Office, *by which means only the*
in the Admiral's *Office can be disch*
ed for the prevention of future *Encro*
ments on the Royal *Rivers, and for*
frustra differtur remedium quod
unic

nicum, *it may be worthy the Care of* ſe *honourable Perſons who adminiſter* t *Office, to ſee ſome ſupport provided* r *that Office as ſoon as may be, and to* pply *to the Crown or the Legiſlative* wer, *as they ſhall find occaſion, for any* ing *to be done, neceſſary to the ſettle-*nt *and ſupport thereof.*

Both becauſe the River of Thames *is* e *moſt principal of the Royal Rivers,* nd *for that the Countrey is naturally* n *all things influenced by the Example* f London, *the effectual* Conſervacy *of* s *River may well ſeem to require the* iority *of their Care. And here af-*r *the example of the Government, that* t *was before mention'd provided* A. 1613. r *the preſervation of the* River *of* Tyne, *that the Perſons who were* ap-pointed *to* View *that* River, *ſhould* very Week *make* Oath *of its* State, nd *the* Abuſes *done to it, perhaps it* ay *appear neceſſary, both to the Com-*iſſioners *of the* Admiralty *and the* Lord Mayor, *to apply to the* Parliament *that a* New *Form of* Oaths *may be enjoyn'd to* ll *Perſons miniſterially concern'd in the Care of the* River *of* Thames, *and the*

which

which kind of Oaths *may likewiſe be joyn'd to Perſons employ'd in the Con vacy of the Royal Rivers in the C trey. This is here mention'd, becauſe conceiv'd, that a* New Oath *cannot impoſed but by Authority of Par ment.*

I ſuppoſe the Lord Mayor's *Dep* Water-Bailiff *was never upon his O not to* connive *at Encroachments on River: But the very* common Fame *bout the* Water-Bailiff's Tenants, *make either a* promiſſory *Oath to t effect neceſſary in the beginning of ev* Mayor's *Year, or at the end of it* aſſertory *one that he hath not d it.*

I know a Gentleman, who charging late Water-Bailiff *with taking of M* ney *from* Encroachers, *was anſwer* That he did no ſuch thing, but wo not deny but that ſome of his fo lowers might do ſo, *Good God! wh unſafe anchoring do all our great Tru in this World find, while we truſt o* Bodies *to Apothecaries Boyes, our E* ſtates *to Lawyers Clarks or the Appre tices of Scriveners, our* Souls *to poor C*

ratti,

and our principal Royal *River to*
ver-baily's Followers!
hen I consider that mighty spirit of
fry that appear'd in France *with*
s, for joyning the two *Seas, a*
that heretofore abash'd the Roman
re, and was attempted and given
in foregoing Reigns, and yet not-
standing the remoteness of the two
the Mountains, the Beggy-Lands,
scarcity of Water in a Countrey.
re there was hardly enough to sup-
the Gardens, and many other diffi-
ies, that it was in a few Years
ght to its perfection, while the
n there was in War against the
powerful States of Europe *united*
ther, I shall wonder much if we
not a stock of Brains and In-
ry enough going to keep our River
Thames.
What great Pains and Charge the
of meliorating that River cost
Ancestors, the Chronicles *tell us,*
how useful for the preservation of
the pains taken in a late Conjuncture,
hen the Cities Charter *was in its*
estate) *by the former Commissioners*

of the Admiralty, proved, is obvi
and therefore the Wisdom of our
cestors in Complicating *the* Office
Lord Admiral *with the Lord* Mayo
its Conservacy, *was very profou*
for the Admiral's *Office being during*
sure, we are sure that whoever have
Office, are the actual *Favourites of*
Government; and by being so, they
with the better success signalized their
ligence in the preserving that River.

It must here in Justice be acknowl
ed, that the late King James, *while*
Admiralty was in his Hands, was
by all the Cares and Business incum
on the Crown, diverted from the Con
vacy *of the River. And if all the*
ticulars of the vast pains taken by
Pepys *therein, while he was* Secret
of the Admiralty, were enumerated,
would fill a much larger Volume
what I here send your Lordship.
concerning himself so much and so of
in the behalf of Petitioning *Seamen*
conceiv'd themselves injured by the Age
of Patentees requiring Money of the
for their Ships lying on the Shoar,
his Frank *interceding with the* Ki

Admiral *for them, and effecting their* ing speedily *righted, and that with-* any *Fee of Office expected or paid,* things *fresh in the Memories of* se *who live by the* Thames-*side below* dge.

And the truth is, to a Person so know- in *the* Office *of the* Admiral, *it* f *needs be known, that* Seamen *being* re *than other Subjects compell'd to serve* Crown *in times of* Peace *and* War, d *at the Crowns own* Rates *both at* me *and* abroad, *are entituled to a* re tender *Protection from the Crown* n other *Subjects are: And that the* amen *being call'd to such* Service *by* Admirals *Warrant, will in the Case* any *general pressure happening to them* rein *the King's Name is used,* ex- t *that the* Admiral *shall* apply *to the* own *in their behalf, as knowing that* Admiral *ever* refused *or* delay'd *in* h *Case to take the trouble of patroni-* ng *theme*

My Lord, *I have now almost done* ubling *you for the present; and yet* cording *to a* Jewish *Proverb, that* Mo-

leſtus ubi ſe moleſtum agnoſcit, non eſt moleſtus, *ſhall hope I have not done it at all. But I ſhall chiefly fortifie my hopes of my not having ſo done, by the Conſideration of its being no* trouble *to you, but an* Obligation *for any One to furniſh your great thoughts with any uſeful* Materials *for the promoting the ſervice of your* Prince *and* Countrey, *in ſuch a* critical *ſeaſon as this, that calls ſo loud for that* Old *heatheniſh Virtus of the* Pietas in Patriam *to awaken it ſo among* Engliſh *Chriſtians.*

We may well believe our Chronicles *that tell us of a* Porter *who ſlept fourteen dayes and nights together, when we have ſeen ſo great a part of a whole Nation after four or five Years, and much longer.*

The laſt Reign ſave one was a time wherein men made pleaſure their buſineſs, and when the Nation ſuffer'd more by Lethargy *than the* Plague. *But as Nature doth now call upon us to make* Buſineſs *our* Pleaſure, *and to build Work-houſes as well as Play-houſes, ſo it may be ſuppoſed that our World is as weary of* ſleeping *as ever it was of* waking, *and that Reaſons for Men's being*

being publick ſpirited and nobly active in all the publick Spheres in Magiſtracy to which they are call'd, may be patiently heard, and that it may ſeem a reaſonable Requeſt, ſince we ſee in things natural, ſome inanimate things to ſerve the Nature of the Univerſe do ſometimes forgo and quit their particular Nature (and as for example, water to prevent a Vacuum which Nature abhorrs, doth aſcend,) that Magiſtrates would go on in their own natural Courſe to what lyes in the plain way of their Duty, and what is incumbent on them by moral Obligations. Faxit: And that he may neither be a ſhame to, nor aſhamed of his Countrey, who hath the Honour of being

My LORD,

Your Lordſhips moſt Humble

and moſt Devoted Servant,

T. H.

THE

ERRATA

In the foregoing Letter to the Earl of *Marlbourgh*.

PAge 2. for ἔυρηχα! read ἔνρηκα. p. 14. for *Britannij* r. *Britanni*. *ib.* for *Robora* r. *Robori*. p. 18. l. 3. after the word *Corporation* close the Parenthesis. p. 26. for *Moral* r. *Morals*. p. [illegible] for *raris* r. *Ranis*. p. 54. for Mr. *Joseph-Coting* r. Mr. *Joseph-Colinge*. p. 59. for *Hydrautica* r. *Hydraulica*. p. 77. l. *penult.* instead of a Point of Interrogation make a *Comma*. p. 87. for the Year 1670. r. 1630. p. 97. for *patriotly* r. *particular*. p. 98. for *Thorna* r. *Thoma*. p. 105. l. 18. for *Subconservators* r. *Subconservator*. ~~p. 110. l. 3. for making r. speaking. p. 110. l. ult. for are r. is~~ p. 114. l. 13. dele *perhaps*.

p. 63. l. 9. for [illegible] r. [illegible]

THE New Invention OF MILL'D-LEAD, FOR

Sheathing of Ships againſt the *Worm*, better for *Sailing*, and Cheaper above *Cent. per Cent.* than the old way with *Boards*.

As alſo For

Bread-rooms, Scuppers, Furnaces, *&c.*

The Objections, Anſwers, Proofs and Proceedings, between the Officers *of the* Navy *and the* Mill'd-Lead *Company, before the late* Lords *of the* Admiralty *and* Council-Board, *ſubmitted to Conſideration.*

ALSO

The ſaid *Mill'd-Lead* from many Years Experience, as well as the reaſon of the thing it ſelf, proved to be much *better* and *cheaper*, for *Covering* of *Houſes*, *Gutters*, *Pipes*, *Furnaces for Dyers*, *Copperas-works*, *Lining* of *Ciſterns*, and other *Veſſels for Brewers*, *Dairies*, and all purpoſes whatſoever, where Sheet-Lead is uſed, than *Caſt-Lead* can be, and the *Plumbers* ſuggeſtions decrying the ſame, proved to be idle, ſcandalous and falſe.

LONDON, Printed in the Year 1691.

BIBLIOTHECA BODLEIANA

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croachments on the River
Thames, *on both sides, fr*
London-Bridge *Eastwards, to*
lower end of Lyme-house, *ta*
by the principal Officers and Co
missioners of his Majesty's Na
with the assistance of the El
Brethren of Trinity-House,
pursuance of an Order of the Lo
Commissioners for executing
Office of Lord High Admiral
England, *Dated the first*
March, 168⅘. *Wherein is*
particularly expressed which of
said Buildings and Encroachme
are old, and which are new,
likewise which of them are judg

A TABLE.

most prejudicial to Navigation and the River, together with References to each of them by Numbers in the Draught of the River lately made by Captain Collins.

To

A SURVEY OF THE

Buildings and Encroachments on the River of *Thames*, on both sides, from *London-Bridge* Laſtwards to the lower end of *Lyme-houſe*: Taken by the Principal Officers and Commiſſioners of his Majeſties Navy, with the Aſſiſtance of the Elder Brethren of *Trinity-houſe*, in purſuance of an Order of the Right Honourable the Lords Commiſſioners for Executing the Office of Lord High Admiral of *England*, Dated the Firſt of *March*, 168¾. Wherein is alſo particularly expreſſed which of the ſaid Buildings and Encroachments are *Old*, and which are *New*, and likewiſe which of them are judged moſt prejudicial to Navigation and the River; together with References to each of them by Numbers in the Draught of the River lately made by Captain *Collins*.

On the South-ſide of the River, from London-Bridge, *Eaſtward.*

Numbers in the Draught.	Buildings and Encroachments.	Dimenſions. Feet from Eaſt to Weſt.	Feet out into the River.	Old or New, and which prejudicial.
1	AT *Allen's* Dye-houſe a Pott Gallery	21	12	
	A Pair of Stairs	21	12	Old
2	Mr. *Cholmley* the Brewer, a pair of Stairs	100	9	Old
3	Mr. *Gibbs's* Wharf on the Eaſt-ſide *Pickleherring-ſtairs*	14	15	Old
4	A Pott Gallery upon the Weſt-ſide of *Still-ſtairs*	90	5.6.7.8.9.	Old
5	A Pot Gallery to the Weſt of *Wheelers-yard*	85	9	Old
6	*Stephen Matthews*, alias Mr. *Lewſley's* Wharf	40	3	New
7	From the Weſt End of Mr. *Cundy's* Wharf to the Weſt End of Mr. *Boddy's* Yard	200	5	New
8	From the Weſt-end of *Cundy's* Wharf to the Eaſt of *Philip Caſtney's* Wharf	37	*W* 3 *E* 23	New
9	Mr. *Partridge's* Wharf	35	*W* 20 *E* 2	New
10	*St. Saviours Dock*, Mr. *Veering's* Timber-Yard	110	*E* 5	New
11	Mr. *Heyden*, junior, alias *Collins's* Yard	40	*W* 5 *E* 28	New
12	Mr. *Heyden*, ſenior, his Launch	50	*W* 30 *E* 3	New
13	From Mr. *Stephens's* Houſe to the Stairs at the Weſt-end of his Yard	127	5	New
14	Mr. *Stephens's* Houſe and Wharf	40	*W* 4 *E* 5	New
15	*Thomas Huggins's* Yard	100	*W* 25 *E* 4	New
16	*William Ebbins's* Wharf	35	*W* 2 *E* 16	New
17	Weſt of *Three-Mariners-ſtairs*	68	*W* 3 *E* 6	New
18	Mr. *Caſtle's*, alias *Narbrough's* Yard	80	*W* 5 *E* 27	New
19	Mr. *Stephens's* Houſe	35	7	New
20	Mr. *Eldridge's* Wharf	100	8	Old
21	From thence Eaſt to *Redriff-Bite*	40	*E* 23	Old
22	From Eaſt-ſide of *Redriff Bite* to the Weſt of *Church-Wharf*	400	*W* 20 *E* 2	Old
23	From the Weſt-ſide of Captain *Bowers's* Houſe to the Eaſt-ſide of Mr. *Whittingham's*	152	*W* 15 *E* 36	New
24	From the Crane againſt *Redriff-Church-ſteeple* to the Eaſt-end of *Slightfoot's* Houſe	130	*W* 28 *E* 16	Old
25	Mr. *Brownloe's* Wharf	26	*E* 8	New
26	Captain *Wardlow's* Houſe	35	34	New, *prejudicial*
27	From the Eaſt-end of Captain *Wardlow's* to the Weſt-end of *Farren's*	600	10	Old
28	Mr. *Farren's* Timber-Wharf by *Ruſſel's* Powder-Mill	50	10	Old
29	From *Farren's* to the Powder-Mill-ſtairs	100	8	Old
30	The Yard in the Poſſeſſion of Sir *William Warren* is	75	20	New
31	Sir *Thomas Gold's* Yard, in the Poſſeſſion of *Graſſingam* and *Collins*	200	100	Old
32	Mr. *Glyde's* Wharf	100	11	New
33	Mr. *Kirby's* Yard	102	11	New
34	From the Weſt-ſide of *Rolfe's* Yard to the Weſt-ſide of *Globe-ſtairs*	175	11	New
35	The Merchants Plank-Wharf on the Eaſt-ſide of *Globe-ſtairs*	60	*W* 8 *E* 25	New
36	Mr. *Shiſhes* Yard and Dock	222	25	New
37	Major *Borne's* Wharf to the Eaſt of Mr. *Shiſhes* Yard	25	25	New
38	*Shepherd and Dogg-ſtairs*	200	*W* 10 *E* 5	New
39	From the *Shepard and Dogg-ſtairs* Eaſtward	80	5	New
40	From the Weſt of Mr. *Hunt's* Gun-wharf to the Weſt of Mr. *Hill's* Timber-yard	160	8	New
41	Mr. *Hunt's* Gun-Wharf	72	8	New
42	Next Wharf to Mr. *Walraven's* Wharf	18	9	New
43	Mr. *Walraven's* Wharf at the Sign of the *Kings-Head*	20	3	New
44	From the Weſt-ſide of the Rape-Mill Weſtward	100	25	New

On the North-side of the River, from London-Bridge *Eastward.*

Numbers in the Draught.	Buildings and Encroachments.	Dimensions. Feet from East to West.	Dimensions. Feet out into the River.	Old or New, and which prejudicial.
1	*Billingsgate*, *Smart's* Key, from the Corner up into the Dock,	2	8	New
	And from thence Eastward	1	8	New
2	*Iron-Gate*, a Causway		100	very prejudicial
3	*St. Katherines*, from *Iron-Gate* towards *St. Katherines Dock* are Pot Galleries	62	8 & 10	Old
4	Mr. *Babbington's* Wharf	8	6	Old
5	Mr. *Butterfield's* Wharf	46	10	Old
6	From Mr. *Butterfield's* to *Ship-Brew-house* a Pot Gallery	60	10	Old
7	*John Parson's* Wharf	21	7	Old
8	*Thomas Harvell's* Pot Gallery	22	8	Old
9	*John Gulick's* Pot Gallery	12	10	Old
10	The Widdow *Pardy's* Cole-Wharf	30	12	Old
11	*Thomas Mallam's* Pot Gallery	15	10	Old
12	Mr. *Bullock's* three Houses Pot Galleries	40	8	Old
13	Mr. *John Batterworth*	8	8	Old
14	*Hermitage* a Causway		100	prejudicial
15	*William Middleton's* Wharf	28	3	New
16	*Robert Partridge*, Anchor-smith	18	12	New, prejudicial
17	Next to him is a Bile about 8 Foot, in which shews all between him and *Anderson* to be Encroached			
18	A Jetty on the West-side of *Anderson's* and the East side of *Fifield's* Pot Gallery, by which it appears that those Wharfs and Buildings on each side of the said Pot Galleries are Encroached		6	New
19	Mr. *Snellgrove's* Yard	120	6	New
20	*Wapping Old-stairs* a Causway		110	prejudicial
21	From Widdow *Moppets* Stairs, Eastward	35	5	Old
22	From thence to the West of Mr. *White's* Launch	20	6	Old
23	From the said Launch to the East-side of *White's* Yard	68	15 2	Old
24	*Wapping New-stairs*, a Causway		105	prejudicial
25	Mr. *Amos Foord's* Wharf	25	8	Old
26	From Mr. *Bradley's* the Anchor-smith's Wharf below *Wapping New-stairs* to Mr. *Snipe's* House	710	20	Old
27	*Wapping-Dock*, a Causway		120	prejudicial
28	From the West-side of King *Edward's* Stairs, East	70	14	
29	A Causway from King *Edward's* Stairs		120	
30	Sir *William Warren's*, the Old Encroachment	162	23	New, very prejudicial.
	the New Encroachment	72	37	
31	From Sir *William Warren's* to *New-Crane-stairs*	190	E 23	prejudicial
32	*New-Crane*, *New-Crane-stairs* a Causway		100	prejudicial
33	From thence to *George King's*, a Boat-builders Yard	240	W 17 E 27	New, very preju.
34	Mr. *Baxter's* Yard or Wharf	200	W 17 E 23	New
35	*Henry Goodman's* Wharf	32	13	New.
36	From *Pellican-stairs*, *James Foster's* Wharf	25	12	Old
37	*Vosse's* Key	140	5	Old
38	*Roberts* and *Allen's* Yard	70	W 2 E 10	Old
39	*Oxenbridge* and *Allen's* Yard	60	10	Old
40	Mr. *Hill's* Gun-Wharf	70	4	
	A Lay-stall 3 Foot, and ready to fall		3	
41	Mr. *Denn's*, alias *Buzby* and *Joyce*	25	3	Old
42	*Bell-wharf* Brew-house, with a large Bite going in, Old,	84	3	Old
43	*Francis Bestwell* 3 Posts about		6	very prejudicial
44	Mr. *Edward Hawkins* Pot Gallery	35	8	Old
45	West-side of *Trinity-Yard*	26	18	Old
	East-side of *Trinity-Yard*	20	11	
46	*Robert Warner's* Pot Gallery	25	8	New
47	Mr. *James Ems* Yard, from the East-side of the Launch to the East-side of the Yard	85	14	New
48	*Ratcliff-Cross*, Widdow *Rooks* Wharf	80	8	New
49	Mr. *Crowder's* Pot Gallery	45	6	Old
50	From the West-side of Captain *Prestman's* House to the West-side of *Queens-stairs*	56	5	New
51	*Queens-stairs*, Mr. *Rich's* a Shipwrights Yard to the East of *Queens-stairs*	60	2	New
52	From the East of *Marshal's* House to the East of *Cox's* Yard	41	W 2 E 8	New
53	*Lyme-house-Bridge*, Mr. *Boyce's* Yard	100	7	New
54	*Wats*, an Oar-makers Wharf, East of *Dick-shore* to Mr. *Graves's* Yard	54	30	Old
55	*Thomas Graves's* Yard and Dock	180	W 9 E nil	Old
56	*John Graves* a Shipwrights Yard	200	50	Old
57	From the Crane in the Possession of Mr. *Margate* to the Stairs by the *Blew-Anchor*	150	6	New
58	*Edward Gray's* Wharf, from the *Blew-Anchor* to the East-side thereof	410	W 26 E 9	New

Navy-Office,
30 *Octob.* 84.

R. Haddock. J. Tippets. J. Narbrough. J. Sothern. Sam. Chamblet. Simon Nichols. Henry Teddeman. Thomas Brown. Isaac Wooodgreen. John Hill. Thomas Collier. Nich. Kerrington. Henry Mudd. William Green.

On the Northside

London-Bri

Buildings and

Numbers in the Draught.

1 BIllingate, Smart's Key, fr
And from thence East
2 Iron-Gate, a Causway —
3 St. Katherines, from Iron-Gate
Galleries — —
4 Mr. Babbington's Wharf —
5 Mr. Butterfield's Wharf —
6 From Mr. Butterfield's to Ship
7 John Parson's Wharf —
8 Thomas Harwell's Pot Gallery
9 John Gulick's Pot Gallery —
10 The Widdow Pardy's Cole-V
11 Thomas Mallam's Pot Galler
12 Mr. Bullock's three Houses P
13 Mr. John Butterworth —
14 Hermitage a Causway —
15 William Middleton's Wharf
16 Robert Partridge, Anchor-sm
17 Next to him is a Bile about
him and Anderson to be Encroa
18 A Jetty on the West-side of
Pot Gallery, by which it appea
each side of the said Pot Galleri
19 Mr. Snellgrove's Yard —
20 Wapping Old-stairs a Causwa
21 From Widdow Moppets Stai
22 From thence to the West of
23 From the said Launch to the
24 Wapping New-stairs, a Causw

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To the Right Honourable,
The
LORDS COMMISSONERS
For executing the Office of
ord High Admiral of *England*.

The humble Reply *of Sir* Philip Howard, *Sir* Francis Watson, *Kts. and Comp. interested in the Manufacture and Invention of* Milled-Lead, *to the late* Report *to your Lordships from the Officers of the Navy, touching the Method of* Lead-sheathing, *used upon his Majesties* Ships: *Wherein they shew to your Lordships,* Octob. 28. 1682.

THat from every Ship of his Majesties that has been so sheathed, they have had complaints of the extraordinary *Eating* and *Corroding* of their *der-Irons* and *Bolts*, beyond whatever was nd upon any Ship not so sheathed, and an-ed a Transcript of several Complaints by m received from several Commanders and o-rs to that effect: And that therefore upon due

ſideration had thereof, and of the many Ex-
riences had of the great damages ariſing
this ſort of Sheathing; They give it as
Opinion, that it will not be for his
ſties Service, that the ſame be longer
upon his Ships: but that the Ships ſo Sh
ed, may have their ſheathing ſtripped off,
new Iron-work ſupplied where defective, as
to prevent any further damage from the
ger Continuance of the ſaid Sheahing
them, as that they may be in a condition of
vice whenever on a ſudden occaſion, the
may be called for.

To which Report, *and the Mat*
of Complaint wheron the ſame
grounded, importing a vehement
geſtion of ruine likely to attend
Ships and Service of his Majeſ
in Caſe this Method of Lead-ſhea-
ing *ſhould be continued: The*
Sir Ph. Howard *and* Comp.
make this plain Return, viz.

THat as their firſt intereſting themſelves
this undertaking, was wholly fou
upon the hopes they had of being enabled
contribute ſomewhat thereby to the Ser
of the Royal Navy, and thoſe hopes con
ed by as ample Inſtances of Publick appro
tion as were ever given to any precedent
vention; ſo do they ſtill give his Maje
Ser

ve the ſame entire preference to all con-
rations of private advantage that either
or can ariſe to them from the ſame un-
hing; And therefore are not only con-
, but deſirous, that in caſe your Lord-
ſhall (after peruſal of this Paper) hold
reaſonableneſs of the ſaid Officers Advice,
ſuppreſſing the further uſe of Lead-Sheath-
ſufficiently demonſtrated by what they
offered as the grounds thereof in that col-
of Complaints: No Conſiderations re-
to the Intereſt or Right of this Com-
, may ſtand in the way of whatever his
eſty and your Lordſhips ſhall think moſt
his Service to determine concerning it.

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*Deduction of the whole Matter re-
ting to the* Lead-ſheathing *of his
Majeſty's* Ships, *with what this Com-
ny do in their Duty hold themſelves
ound on this Occaſion to offer of their
n Reflections and Sentiments thereon.*

was in the Year 1670. when this Com-
ny becoming Maſters of this Invention
lled-Lead; they ſoon met with Encourage-
, not only from ſundry Officers and Buil-
s of the Navy, but from his Majeſty him-
, and his Royal Highneſs then Lord High
miral of *England*, to an immediate expo-
g the ſame to practice.

But such was their backwardness to
sume upon falling into the exercise of
vention, (though never so self-convinc
its Efficacy and Safety) whose first E
ments, and future use, were principally
made upon a Subject of so high consider
as that of the Royal Navy of *England*,
out passing the most strict and solemn
tion a matter of that kind could, and
to have in a Government like this sub
by *Navigation*, namely, That of his Ma
in *Parliament*, that they in the same
brought this their *Invention* into the P
ment then sitting: Where, after all the
rities of Scrutiny capable of being ex
in each of the *Houses* successively, and p
Conferences had with all Persons qu
for giving Advice therein, and those a
ed not only with the prejudice all new
positions ordinarily meet with, but from
position of the Persons interested in the
servation of the old ones, (whereof more
after,) it not only received full Approb
by being passed then into an *Act*, but ha
same done in Terms the most expressi
the Conviction and Satisfaction where
his *Majesty* and *Parliament* passed the said
with regard both to the *Invention* and
tors; as by part thereof following ap
viz.

An Act for granting unto Sir *Philip Howard*, Knight, and *Francis Watson* Esquire, the sole use of a Manufacture, Art, or Invention for the benefit of *Shipping*.

Whereas it appears upon Examination that Sir Philip Howard, Knight, and Francis Watson, Esquire, by great Charge and Industry have found out a New Manufacture, Art, or Invention to preserve Ships, and other things under Water, with certain Commodities chiefly of the growth of his Majesties Dominons, which is much cheaper and more smooth, and durable than may by Deals for Sheathing, or Pitch, Tarr, Rozin, Brimstone, or any thing hitherto used: Now for the Encouragement of Ingenuity and Industry in the like cases; and to the intent that the said Sir Philip Howard, and Francis Watson, may be protected in the use of the said Manufacture, Art, or Invention, and have encouragement to make the same known, for the benefit of his Majesties Dominions in general, &c.

This being done, and the said Company not only invited, but by his Majesty commanded to apply themselves forthwith to the making in use this Invention upon some of his Majesties Ships, they by his Order, and on Terms

adjusted with the Officers of the Navy, ceeded to the making the first Exper thereof at *Portsmouth* upon the *Phœnix*, month of *March*, 1670, and not long afte the like upon several others, of which following were part, *viz.*:

Dreadnought.	*Foresight.*
Henrietta.	*Vulture.*
Mary.	*Rose.*
Lyon.	*Hunter.*
Bristol.	*Harwich.*

But your Lordships may be pleased be informed, That (however upon the given it by Parliament) this Company so let in by the Officers of the Navy exercise of their said Invention; yet not without fresh assaults from some were interested in the benefit arising fr labour, and the Materials employed bringing on, and stripping off the *Wood ing*, in whose place this was to succeed by their Arts and Industry, were Sir *Howard*, and *Company* in a restless man ged to give Answers (all over again) to the ctions formerly raised against them, and t vention in Parliament, namely, *Its excess above the ancient method, its rough lying on Sh to the prejudice of their Sailing. Its liablene ling from the Cables, and cracking when bro ground. Its tediousness in bringing on and of nass to foul, and difficulty in cleansing. La* undur

durableneſs and doubtful efficacy in what was juſtly expected from it againſt the Worm.

But ſo convincing were the *Solutions* brought (as before) to every particular, and the ſame ſo confirmed by a three years proof by this time made of the whole, and more eſpecially by a Perſonal view had by the *King* himſelf of the *Phœnix*, then come in and Careened at *Sheerneſs*, in the Year 1673. after two Voyages to the *Streights*: That his Majeſty to put an end to the unreaſonable importunities till then continued upon himſelf and them on this ſubject, was pleaſed by his then *Commiſſioners* of the *Admiralty*, to give a final Declaration of his Opinion and Pleaſure concerning it, in an Order from thoſe Lords to the *Officers* of the *Navy*, bearing date the 20th. of *December* 1673. as followeth, *viz.*

After our hearty commendations, in purſuance of His Majeſties Pleaſure ſignified to us himſelf at this Board; that in regard of the many and good proofs which had been given of the goodneſs of Sir Philip Howard, *and Major* Holmon's *Invention of Sheathing his Majeſties Ships with* Lead, *in preference to the doing of it with the materials, and in the manner anciently uſed, (with reſpect had no leſs to the charge thereof, than the effectual ſecuring the Hulls of his Majeſties Ships againſt the* Worm) *his Majeſties Ships may for the time to come be Sheathed in no other manner than that of Lead, without eſpecial Order given for the ſame from this Board: Theſe are to Authorize you to cauſe this his Maje-*

ſties Pleaſure herein to be duly complyed with. ſo we remain,

Your Loving Friends,

Angleſey.
Ormond.
G. Carteret.

Notwithſtanding which, ſuch was the reluctancy (or Caution) wherewith the Offi of the Navy did yet think fit to proceed t adventuring to give any Encouragement to t Invention, That not adjudging a three Ye proof available in this Caſe, they thoug expedient to take two Years more, and benefit of what Obſervations they could e make or collect from the ſeveral *Lead-ſhea* Ships employed on Southern Service wi that time, the better to enable themſel without miſtake to determine concerning execution of his Majeſties ſaid Order; w indeed (after the five Years end) they comply with, by entering into a ſolemn Co tract with Sir *Philip Howard*, and *Co* for the future ſheathing his Majeſties Sh with Lead, and this with ſuch alacrity fulneſs of ſeeming Conviction concerning advantageouſneſs to the King, that (be their voluntary exchanging *many and good* &c. the terms of his Majeſties ſaid Order, to *ſufficient proof and Experience of the Go and Uſefulneſs of the Invention of Milled-Le and Nails for the Sheathing and preſerving*

gainſt the Worm) they would not permit the ſaid Company to reſerve to themſelves any part, but would ſecure to the King in the ſaid Contract a Title to the whole term then remaining of the time for which they were by the *Act* of *Parliament* inveſted in the ſole benefit of their Invention, and whereof there was then twenty years yet to come. And thus ſtood this Matter at the cloſe of the Year 1675. when it might reaſonably have been thought, that it had come to ſuch, and ſo deliberate a ſettlement, as no new ſcruples could have been raiſed about it, on the part of the Navy Officers, or any occaſion of freſh diſquiet created to this Company.

But ſo it was ordered, or at leſt fell out, that no ſooner were all things thus ſeemingly ſetled, and eſtabliſhed at home, but a new Cry, and of a quite new kind, breaks out from abroad, of a quality diſcovered in our Lead-ſheathing, tending (if not timely prevented) to the utter Deſtruction of his Majeſties Ships, namely, That of the *Eating* into, and waſting their *Rudder-Irons* and *Bolts* under water, to ſuch a degree, and in ſo ſhort a ſpace of time, as had never been obſerved upon any unſheathed or Wood-ſheathed Ships.

Nor lay this long unſeconded by concurrent Advices from *Portſmouth*, in reference to ſome of them that were ſheathed with Lead, and then in that Harbour, and the Accompts thereof circumſtanced with ſuch particularities as ſeemed to obtain Credit not only with the Navy Officers, but his Majeſty, and the Lords of the Admiralty, and even this Company too,

at leaſt ſo far, as to excite in all a deſire of Inquiry into the true grounds of it.

In order to which (leaving it to the Navy Officers to give your Lordſhips an Account of theirs, as we ſhall (by and by) of our own Endeavours therein) it pleaſed his Majeſty and my Lords of the Admiralty, not only by ſeveral Orders to recommend to the ſaid Officers the general matter of this Enquiry, but (upon a ſuggeſtion made to them by this Company, of their apprehending this evil to arise from ſome *defectiveneſs* in the Iron-work itſelf, with a tender of their ſervice, towards finding out the full truth thereof) to direct the Officers of the Navy by no leſs than ſix ſeveral *Orders* within the Months of *April* and *May*, 1678. to receive from the ſaid Company what *Rudder-Irons* ſhould be ſo provided by them, and employ no other upon any Ships to be thenceforward *ſheathed* with *Lead*, than what were ſo provided, ſince which (being full four Years and an half) this Company have nevertheleſs been ſo far from having any opportunities given them by the ſaid Officers of doing his Majeſty the ſervice by theſe Orders expected, That the firſt and only ſight or knowledge we have of what progreſs they in all that time made towards the deciſion of this matter, is what your Lordſhips were pleaſed ſo lately to ſurprize us with in this their Report; wherein the whole ſuppoſed Conſumption of the Iron-work of his Majeſties Ships, and all the ruinous Conſequences apprehended therefrom to the Navy, are expreſſly laid on Lead-ſheathing, and that only; and grounded this their ſentence upon

no other Inducements (for ought appears) than the particulars of Complaint accompanying the ſaid Report: The Truth, Conſiſtences, and Concluſiveneſs of which Complaints for proving the chargeableneſs of this evil on Lead-ſheathing, your Lordſhips will (we doubt not) ſee through, upon a bare review of the ſaid Complaints, joyned with this their Reaſoning therefrom, as follows.

1. From Sir *John Norbrough*'s ſaying, That in *July* 1678, the *Plymouth*'s Rudder-Irons began to be much eaten, doubting his being forced thereby to ſend her home that Winter, from the incapacity he was in, of getting her recruited abroad, and Sir *R. B*'s adding in *September* 1682. that had ſhe not been ſupplyed with new Rudder-Irons before her coming out of the *Streights*, ſhe had been in the ſame ill condition with another Ship he had then newly ſpoken of; whereas we are under no doubts of Sir *J. Narbrough*'s owning to your Lordſhips what he has lately done to ſome of it, that ſhe had no ſupply of freſh Rudder-Irons abroad, but came home with her old ones, and thoſe (it ſeems) in ſo good caſe, that Sir *R. B.* could not diſtinguiſh them from Irons of a new ſupply.

2. From Sir *R. B*'s deſcripition of the ill condition of the *Harwich*'s Iron-works diſcovered at her cleaning in 1682. in their being eaten away to nothing, ſo as to make it matter of wonder that ſhe ſunk not in the Sea; whereas (beſides her ſaid Iron-works having been faſtened

ened in her five Years and an half, without any Complaint heard of concerning them all her Voyage, or at her coming home in *July*, 1675. Sir *R. B.* muſt be thought ſubject to ſome miſtake; or both he, and the Surveyor of the Navy made accountable for a breach (much leſs eaſily anſwered for) both of the general Laws of the ſaid Navy, and their particular Inſtruction therein, by ſuffering a Ship of her Value, and coming home in ſo ſinking a condition, to lye afterwards above three Years in Harbour unſearched.

3. From Sir *John Kempthornes* Complaint in *June* 1677. of the *Dreadnought*'s Rudder-Irons being within a Year and an half (and that in Harbour) ſo eaten, as not to be fit for her being adventured to Sea again with them, for more than a ſmall tripp; and that followed by a later, from Sir *R. B.* in *October* 1681. wherein (after her having been abroad) he makes the Condition of her Iron-works ſo miſerable, as to be under the ſame wonder he was before, that ſhe alſo had not ſunk at Sea; whereas it appears even from their own *calculations*, that her firſt ſet of Rudder-Irons laſted her four Years and an half, (which were it a common ſtandand for their duration, and then to be renewed, would yet leave *Leadſheathing* greatly cheaper than that of *Wood*,) and her ſecond (for ought that appears of any ſupplies) ſix Years and three quarters.

4. From a *Certificate* of the *Officers* in *Portſmouth-Yard*, in *October* 1677. declaring the Condition

...ion of the *Lyon's Iron-works* under water, to ...such as they never saw in any Ship they ...er had to do with, not *sheathed* with *Lead*, ...ough droven twice as long: Whereas that ...*tificate it self* does not only expresly confess ...*Bolts* having been all in her five Years; but ...ill here furnish your Lordships with one In...ance (besides the many you may hereafter ...eet with) of what this Company is owing ...r, to the sincerity as well as Thoughtfulness ...f its Accusers, if your Lordships shall please ...o have their last Assertion examined by the ...ooks of the Navy Officers, with whom it ...rries so much weight, this Company being ...ell assured, that instead of no Ship, not ...eathed with Lead, being ever found perish...d in their Iron-work under water in twice ...e years, variety of instances will be met ...ith, within much a shorter time.

5. From Sir *John Narbrough's* saying in *February 1676.* that he had found the condition of the *Henrietta's* Iron-works no other than that of the forementioned *Harwich*: whereas your Lordships may be pleased (here) to take notice, that the Lords your Predecessors in the *Admiralty* did by their Order of the *9th* of *April* 1678. (upon some Complaints touching the Iron-works of this Ship,) recommend to the Officers of the Navy, the making a strict enquiry into the general and natural Reasons of this great Evil, directing them twice in the same order to the particular case of this Ship: For execution whereof the said Officers contented themselves, with answering the Lords not

not with any effects of their own Inquisition, but with a bare Transcript only of Sir R. B's Conceptions thereon from *Chatham*; who (had they so thought good) they could as well have given their Lordships something of their own, by communicating to them the Result of an *Occular* Survey by them had in their Publick Office (this Company being present) of the Rudder-Irons themselves, sent from *Chatham* for that purpose; where (upon the outward coat of the said Irons being eaten off with Rust) the inside of their *Pintells*, (as never having had their *due welding*) discovered themselves in three several arms or branches like the stalks of so many Tobacco-pipes, not only to the removing the wonder of this Sad condition, but confirming the suggestion the Company had before made to his Majesty and the Lords touching the *Smiths neglects*, and contributing not a little towards the making a right Judgment in the Matters in question, of which more in its due place.

6. From Sir *R. B*'s observing in *September* 1682. the eating off of two of the lower *Pintells* and *Gudgeons* wholly, and a third in part of the *Rose*, which will not (as this Company conceives) be thought very extraordinary when it shall be understood that this is the first and only Complaint heard of her, not only after two Voyages to Sea, and one of them three years long, and her having lain now three years more in Salt water in Harbour; but after her having worn those Irons eight years, and the Complaint it self (when all is done)

amou-

mounting only to three Pintells and Gudge-, without any thing objected to the reſt of her Iron-works.

7. From Sir *John Narbrough*'s Information in *July* 1678. touching ſome defectiveneſs then diſcovered in the *James* and *Charles Gallies*, which he fears would force him to ſend them home that Winter, as not being repairable in the *Streights*: Whereas the *James* being ſheathed, and ſent forth in *October* 1676. continued there three years, when making a Tripp for *England*, ſhe within two months after return-ing thither, and has there remained to this day (being in all ſix years) without ought ſaid by the *Officers* of the *Navy*, of her having any defects of her *Rudder-Irons* in all that time either at home or abroad.

And for the *Charles*, which accompanyed the *James* to Sea in *October* 1676, (inſtead of being driven home, as Sir *John Narbrough* apprehended in 1678.) ſhe continued there till about *Auguſt* 1680. (being four years) and has now remained at home above two years more, (in all ſix years) without any ſuch repairs alledged to have been given her either in the *Streights* or here.

8. Laſtly, From theſe particulars of eight Ships, thus circumſtanced, the Officers of the Navy have held it reaſonable to aſſert to your Lordſhips their having received Complaints of the extraordinary Corroſion of the Iron-works of every of his Majeſties Ships ſheathed with Lead: Whereas theſe make but eight of twen-

ty

ty so sheathed, without any thing either offered now, or heretofore appearing to this Company in exception to the other twelve, *viz.*

Mary,	*Hampshire*,	*Kingsfisher*,
Defiance,	*Foresight*,	*Hunter*,
Woolwich,	*Phœnix*,	*Vulture*,
Bristol,	*Assistance*,	*Norwich.*

but on the contrary many Instances might be drawn from them, in advantage to the Credit of Lead-sheathing, of much more force (were that the business of this Paper) than any thing of what has been before offered in its diminution:

But this Company humbly referrs your Lordships for that to the Navy Officers, contenting themselves with an Appeal only to the *Phœnix*, and *Norwich*, the first and last of all the twenty: The former of which coming home after two Voyages, and three years spent therein, happened (as has been already mentioned) to *Carreene* at *Sheerness*, where his Majesty receiving full satisfaction in her having answered all that was aimed at in this sheathing, she from thence proceeded to *Guiny*, and after return in 1674. was sent to *Jamaica*, (Voyages all calculated for the proving her against the Worm,) and coming back, was in 1677. stripp'd of her sheathing, and then sent abroad unsheathed, without having one

Bolt

Bals under water ſhifted from her being ſo ſheathed to that day, being ſeven years.

And for the *Norwich*, we are well informed, that not one word of Advice, much leſs of Complaint has ever been received either from her Commanders, or any other hand, of the leaſt defect diſcovered in any of her Iron-work under water during the whole four years time of her ſervice in the *Weſt-Indies*, from her firſt ſheathing to the day of her Miſcarriage.

This is a Miſtake, for ſhe was neglected to be ſheathed with Lead, thô Order'd.

Nor does this Company (after having thus opened the matters of Fact reported in theſe Complaints) conceive it will appear to your Lordſhips leſs allowable for them in this place, to make one Remark upon what the Officers of the Navy have offered in the ſame Paper of ſuggeſtions Philoſophical, in ſupport of their preſent Sentence againſt Lead-ſheathing, which is, that they were ſuggeſtions, which ſeem rather calculated for the giving countenance to an Opinion already eſpouſed, than for the raiſing an Opinion upon that, is yet in ſeeking; One being that of Sir *John Kempthornes*, who with ſome of his Officers lighting upon a piece of *Milled-Lead*, (which ſeemed to them to have taken ſome wet) they conceived it preſently to look of a *Cancerous* and *Corroding* ſubſtance, and venomous to Iron, (qualities not uſually judged of by the Eye) promiſing the ſending up a Sample of it to the Officers of the Navy for their Inſpection; which if they did, the ſaid Officers would not have needed any other Evidence againſt Lead-ſheathing, than their Experiments upon this one piece, had

had Sir *John Kempthornes* conceptions of it, met with any Confirmation therefrom; wherein your Lordships will easily receive full satisfaction from the said Officers.

Another, That of Sir *R. B's*, who in his Declaration upon this matter charges this *Eating* of the *Lead* to the *mixture it is prepared with for the making it run thin, by which it is rendred of a more blew colour than Lead ordinarily is, and with Salt-water creates a kind of Coperas that consumes the Iron-works under water*; whereas whoever is conversant in the method of this Company in the *manufacturing* part of their *Invention*, know that the only *mystery* thereof lies in the application of *Lead* to *Rollers*, by which it is reduced without any *inequalities* to what degree of thickness or thinness is demanded, without the least other *Preparation* or *Mixture* exercised upon the *Metal* it self, but is pressed, and brought upon the Ships sides as *simple*, and *unaltered* as ever it flowed from the Pig.

The last, that of Sir *John Narbrough's* Opinion of its being *the Copper covering the Rudder-Irons, and the Copper nailes the sheathing is fastened with, that destroys the Iron-work*: whereto we hold it unnecessary here to return any thing in opposition more, than what the said Officers at the same time present you with of a quite contrary Principle, though in maintenance of the same Position, from Sir *R. B.* who expressly declares his having found by experience, *That it is not the Irons covered with Copper, and nailed even with Iron Nails, that suffer from the Rust; but only those which*

the

the Lead together with the Salt water drains and falls upon.

And this, My Lords, having been ſaid in Reference to all that the Navy Officers have in their *Report* thought fit to give for the grounds of this their ſo poſitive Determination againſt *Lead-ſheathing*: And wherein this Company have only this to ask, that they may not from ought they have already, or may yet further ſay upon this occaſion, be miſunderſtood by your Lordſhips, as if they were under any diſbelief themſelves, or aimed at the getting any in others, touching the Truth of Fact now diſcourſed upon, there being none more ſenſible than themſelves, both of the Reality of this waſt of Iron-work by *Ruſt*, and the ill importance of it, in its conſequences; They now proceed to the giving your Lordſhips the beſt aſſiſtance they can towards the diſcovery of what is the true ſourſe of this Evil, and that in the plainneſs of this following Method, *viz.*

1. By ſubmitting to your Lordſhips their Opinion, and its Reaſons, That the Sheathing of Ships with Lead, neither is, nor can (as ſuch) be the true *Cauſe* of this *decay* of *Iron-work*.

2. By doing the like in reference to the *Evils* (for they are more than one) whereto this matter under enquiry ought rightfully *to be imputed*.

3. By

3. By conducting your Lordships to that which they take to be the only, certain, speedy, and effectual *Expedient* of arriving at the *Truth* in this matter.

1. For the *First*, Against the charging this Mischief upon sheathing with *Lead*, be pleased to receive the Measures of this Companies judging therein, in the following Considerations.

(1.) That without taking upon us to Discourse as Philosophers of the different Structures, Consistences, Sweetnesses and Acidities of *Bodies*, and other Difficulties wherewith they have been frequently entertained, in their Enquiries on this Subject, They have made it their Endeavours to gather the best Information they can, by resorting to that purpose, to Persons of most allowed Name in Natural *Philosophy* and *Chymistry*, without being able hitherto to meet with one that will admit any thing to lye within the whole nature of Lead, that either singly, or from any alteration that can be begotten by its meeting with *Salt-water*, can contribute ought to the *decay* of *Iron* by *Corrosion*, as being a Mettal so void of any disposition that way, as to subdue that very quality of *corroding* in other Bodies the most acid and sour, of which, as we have had the honour more than once of hearing his *Majesty* himself discourse in Confirmation, so do we readily and humbly referr your Lordships not only to the same Royal Advice, but to the honourable and learned Gentleman, and most eminently so, for his researches into those abstruser

ſenſer parts of *Natural* Knowledge, Mr. *Boyſe*, or whoever you ſhall pleaſe to conſult with herein, taking with you the like conſideration about the *Nails*, to which ſome (as has been already ſhewn) ſeem more inclinable to impute this Evil, than to the Lead, our daily experience ſhewing them at ſeven years end, as free from *Ruſt*, as at their firſt driving, and being ſo *Ruſt-proof* in themſelves, will not any more be admitted with thoſe we have diſcourſed with, as capable of infecting with Ruſt any other adjacent, or even continguous Metal.

(2.) That from beyond the Memory of Man, and therefore before the being of this Invention, (at leaſt within theſe Dominions) univerſal Practice both in his Majeſties *Yards*, and Merchants Buildings, has and does at this day make *Lead* the common ſecurity of *Iron-work* againſt *Ruſt*, not only by covering therewith (upon all Ships unſheathed, and deſigned on long Voyages) the *Iron-work* about the *Rudder*, but by *capping* the *heads* of their *Bolts* under water with pieces of *Lead* ſized to, and nailed over the ſaid Bolts.

Nor is this all, for at this day whatever *Merchant-Man*, or *Man of War* is appointed for a Voyage where the *Worm* eats, the back of her *Stern-poſt*, and *Beard* of her *Rudder*, are *ſheathed* with *Copper* or *Lead*, and this even where the Ships alſo are ſheathed with *Wood*, the *Eaſt-India* Company it ſelf, (upon whom we may beſt depend for cautions, wherever preſervation of Ships is in queſtion) not omitting in that very caſe, to *ſheath* their *Rudders* with *Lead* or *Copper*.

Which

Which Practice could certainly never have prevailed with our Fathers, and been followed with so continued a consent to this Day by us, if the vicinity of either of these Metals asserted (as is by some imagined) by Salt-water, had been ever found of so pernicious and certain Effect upon the very Matter they are imployed to secure.

(3.) Nor does what is thus approved of in the general, and universal Practice of *England* want its confirmation, by the like of several Forreign Nations, to wit, the *Dutch*, *Portuguese* and *Spaniard*; the first of which are equally observant with us, in the *sheathing* their *Rudder Irons*, and the *Back* of their *Posts* with *Lead* or *Copper* upon all Ships bound in the way of the *Worm*; and for the two latter, not only the *Rudders* but the whole *Bodies* of their Ships under Water, even of their *Gallions* themselves, have of long time been, and are well known at this Day to be entirely *sheathed* with *Lead*; which concurrence of these two latter *Nations*, seems in this Cause so much more considerable than that of any other, by how much not only their Voyages are the longest, their hazards therein from the *Worm* the greatest, and *Cargoes* the most valuable of all that Navigation knows, but for that the *Hulls* of their Ships abound the most with *Iron-work*, as having all that in the fastening of our Plank we perform with *wooden Trunnels*, done by them with large *Spikes* of *Iron*.

(4.) Lastly, Were this Spoil of Iron-work chargeable

chargeable with nothing but what is contained in the *Lead* and *Nails*, theſe pretended Effects of theirs would be *conſtant* and *uniform* in all Ships alike ſheathed; whereas nothing is more frequent than the Inſtances of their *Inequality*, as will enough appear from a bare Obſervation of what lies before your Lordſhips in this very *Report* of the *Navy-Officers*: Foraſmuch as this *Company* dare put the whole Credit of their Cauſe upon that one *Iſſue*, *viz.* of your Lordſhips ever finding an *Equal Conſumption of Iron* under Water, whether upon the ſame, or different Ships at any one time, or equal diſtances of time; the Account now before you of the twenty Ships that have paſſed this Method of Sheathing, affording a moſt ample Proof of this *Inequality*, by having eight of them loaden with Complaints, (and every one of them different from the reſt, and at different times from it ſelf) while we are yet to be told, whether the other twelve were not, as we are ſure ſome of them were) free from all ground of Complaint.

To our *Second* Undertaking, we conceive the *real Cauſes* of this *Evil*, (that is to ſay, ſo much thereof as is Extraordinary) to be theſe three. 2.

1. The *perfunctory Performance* of the *Smiths* work in this Affair, by ſome Deficiency either in the choice, mixture or temper of his *Metal*, or failure to give it its due *welding* or working: Foraſmuch as by this alone can be reconciled the forementioned *Diſparities* in the Dura-

Duration of *Iron-work*; whence otherwise
it be, that all other circumſtances (wh
that Diſparity can be referred) being the
but the matter, one particular Piece of
ſhall remain undiminiſhed three times as
as that next to it; and this not only in ſ
ed Ships (as in the Caſe of thoſe before
but unſheathed too; as (to give but one
ſtance, in a Cauſe where every Ship is
ther) appears in the *Swiftſures* firſt *Voyag*
the *Streights* with Sir *Rich. Rooth*, where
of her *Rudder-Irons* were eaten entirely in
ces, and ſhifted at her return in *Portſ*
Dock; while at the ſame time *the reſt* (th
all put on together ſeveral Years before)
found as firm and unwaſted as at their
faſtening.

The conſideration and thorough convic
of which led this *Company* in the *Year* 1678. (w
theſe Complaints were moſt active, and
Lords of the *Admiralty*'s Inquiſitions into
Reaſons of it, the more preſſing) not onl
Communicate to them, and the Navy-
cers their Opinions therein, but at t
own hazards and the Ordinary Price, to
come Undertakers themſelves for what
ther Rudder-Irons ſhould be from thence
ed for (whether at home or abroad) by
Lead-ſheathed Ships: Which Propoſition
not only approved of, but the *Officers* of
Navy (as has been already ſaid) by Order
on Orders from their Lordſhips directed
ſee the ſame inſtantly put and continue
practice.

But whence it was that thoſe *Orders*

...h no better complyance, or how it came ...ass, that so certain, speedy and chargeless ...*Expedient* of coming by the *Truth* in a matter ...his Importance (and after a provocation too, ...ublick and seasonable, as that of the *Henriet-* ...Rudder-Irons above mentioned) could be so ...regarded as never once to be set on *Tryal*, ...r Lordships will be best informed from ...m themselves, by whom variety indeed of ...ps were sent to Sea, subsequent to the said ...*ders*, but without any call or notice given ...reof to this *Company*, that his Majesty might ...e the proof and benefit of the Service so ...h expected from them, and required from ...e said Officers both by the King and Lords ...this occasion.

2. The manifest and knowing *Omission* of the ...rsons charged in seeing the said sheathing ...ought on, to do in this case what the pra-...ice of all times, and at this very day, both ...the Kings and Merchants Service, has made a ...nding and necessary piece of care to be ex-...rised in the fitting forth of all Ships (sheath-...d and unsheathed) bound on Forraign Voya-...s, namely, The *parcelling*, or laying with ...*ar* and *Hair* all the Iron-work under water, ...fore the sheathing, (in case of the former) ...r the forementioned *Capps* (in case of the lat-...r) be brought over them.

In which as we are ready to appeal to the ...*Surveyor* of the *Navy*, or whoever else is con-...ersant in the Rules and Methods of *Ship-...Building*, for the *Truth* of what is here assert-...d, and what is owned in some of the Navy ...Officers own Evidences, and particularly in a

Letter of Sir *R. B's*; ſo do we willingly referr our ſelves to the ſame *Surveyors* for the Truth of this ſuggeſtion of ours, touching the under Officers omitting the performance of this their known Duty of laying the Iron-work under water, at their bringing on the ſheathing of the ſaid Ships.

And if ſo, and that this Companies pretenſions in this Method of ſheathing never exceeded further, than to anſwering the effects of *cheapneſs*, and other circumſtances of advantage appertaining to the prevention of the *Worm*, (as the *Act* of *Parliament*, and their Contract with the King abundantly prove) what more Reaſon is there for their being held accountable for the Conſequences of this Omiſſion in the Kings Officers, than for that of *ſtopping* of a *But-head* in a Ships ſide, that never had its due faſtening? It being no part of their Undertaking to anſwer for the *Tightneſs* of the ſheathing when laid on, and droven with Nails further than for its *impaſſableneſs*, not to the *Water*, but to the *Worm*: And that being allowed, what can be more *demonſtrable*, than that the *neglect* of ordinary Cautions, muſt be attended with the ordinary Evils, thoſe Cautions were provided againſt.

Of which, that this of giving the *Iron-work* of theſe *Lead-ſheathed* Ships, their ordinary Defence againſt the *Salt-water* by *Pitching*, or laying them with *Tarr* and *Hair* under that Sheathing, is one, we ſhall not need to confirm to your Lordſhips by more than the ſingle inſtance of the *Phœnix*, which having had her *Sheathing* performed by Sir *Am. Deane* at *Portſmouth*,

with, with this *common* right done to her, appears not to have had one *Bolt* ſhifted within the whole ſeven Years of carrying the ſame: Nor are your Lordſhips without an eminent proof of your own, touching the conſtancy and univerſality of this practice of laying the *Iron-work* of all ſheathed Ships with *Tarr*, and *Hair*, or *Parcelling*, and the acknowledged importance of it, for the ſecuring the ſaid Iron-works from the Salt-water, (which alone can perform upon that Metal, all that is here laid upon the Lead) in the *Happy Return*, ſheathed but very few dayes ſince with *Wood* at *Woolwich*, where your Builder will be found in the ordinary courſe of his Trade to have laid with Tarr and Hair all her *Bolt-heads* under water, and faſtened *Caps* of Lead over them, notwithſtanding this ſheathing with Wood was to be brought on over all.

3. The unaccountable *continuance* of theſe Ships for nine, ten, and eleven years together in their *ſheathing*, without their being in all that time *unſtripp'd*, for the neceſſary *ſearching* of their *bottoms*, and timely ſupplying the *defects*, (whether in Iron-work, or otherwiſe,) which are of courſe to be expected within their proper diſtances of time; which as it contradicts all ancient practice both of the Royal *Navy*, and that of Merchants, eſpecially in the caſe of Ships of value, and under careful Owners, ſo ſeems it in this of ours, to be deſigned only to render that very *Vertue* for which (amongſt others) *Lead-ſheathing* exceeds all that ever went before it, namely, *its durableneſs*, a Vice of much worſe conſequence

to the health of a Ship, than all it pretends to do, and does against the Worm, can make amends for.

Your Lordships might otherwise be pleased to inform your selves from the Officers of the Navy, whence it comes to pass, that after such Complaints received from abroad, as they have handed to your Lordships, touching the dreadful *decays* of those Ships Iron-work under water, they should suffer them, when come home, to *continue* for two, three, and four years together in *Harbour*, without any thing more done in all that time, towards their Relief against the *growing Mischiefs* they are yet daily exposed to, than a Declaration of *Wonder* at the three or four years end that they had not before sunk in the Sea.

Very dissonant is this Method of Proceeding (my Lords) from the Primitive and present Institution of the *Navy*, that provides so carefully both in its joynt and separate *Instructions* to the Officers thereof, and more particularly to the *Surveyor*, not only for the general good Government and Preservation of his Majesties Ships, but a more strict and *Annual* State to be had of all their respective Hulls, Masts, and Yards, in order to your Lordships taking such course for their Ransackings, Groundings, Dockings, and Repairings, as by you shall be thought most for his Majesty's Benefit.

Nor are those *Instructions* a little inforced upon the said Officers by that *standing Article* in the ordinary Estimate of the Navy, wherein they Annually make Demands of a par-

particular ſumm of Money towards their Execution thereof, nor were ever denyed the Allowance of it by his Majeſty, as Duties owned on each ſide neceſſary to be performed.

Which, how far it has been done in reference to thoſe unhappy Ships, which of all others have the leaſt reaſon to ſuffer under this neglect; for that by the terms upon which their Sheathing is performed by this Company for the benefit of the King, They are well able to bear the charge of their having it done twice within the Time, ſome of them (to the hazard of their Ruine) are ſuffered to remain under its being done but once. We humbly ſubmit to your Lordſhips, and (with our full concurrence to that part of their Report, wherein they have at length bethought themſelves of adviſing your Lordſhips to order the doing of that now, which the Practice of the Navy, and the acknowledged condition of thoſe Ships would have expected their having done long ſince) proceed to the third and laſt branch of our Undertaking, and to that humbly ſay, *viz.*

3. That in order to our leading your Lordſhips the more ſatisfactorily to what we take to be the only True and Competent method of rightly determining of the different validities of what has been ſeverally offered and aſſerted by the Officers of the Navy, and this Company, in Maintenance of their different Conceptions touching the Evil now enquired into: Your Lordſhips may in the firſt place be pleaſed to take notice, (and therein to have the Opinion of the ſaid Officers) that no Ship how-

however ſheathed or unſheathed, did ever make a Voyage to Sea, where her Iron-work came not home in a *greater* or *leſs* degree ſeized on, and impaired by *Ruſt*. Next, That this *Company* does voluntarily take upon it (beyond what by any thing in their Contract they are obliged to) an accountableneſs for this their Method's being as ſecure on behalf of the King, in reference to this very point of the Iron-work, as Wood-ſheathing, or any other hitherto known, can be ſhewn to have been.

Which being premiſed: And foraſmuch as nothing is more *true* in *Fact*, or more legible in the Records of the *Navy*, than the conſtant charge the Crown has been always at for the ſhifting and ſupplying the *defects* of *Iron-work*, beſides what is to be read in the heaps of decayed Bolts, Rudder-Irons, *&c.* rarely miſſing in his Majeſty's Yards, but after a ſale: And whereas it is no leſs manifeſt, that among the other Inſtances already ſpoken of, of the unequal decay of Iron-works, this is one, viz. That it has not been ſeldom noted to exceed in the ſame Ship while unſheathed, what it has at another time been, even while in a Lead-ſheathing; witneſs the forenamed *Phœnix*, which being furniſhed with a new *Sett* of Rudder-Irons, at the ſtripping of that Sheathing in *Jan.* 1677. and ſoon after ſent ſo ſtripp'd to the *Streights*, was forced in the very ſame Year, about *Chriſtmas*, to ſhift every one of them, but one Brace, and much of her Bolts, and other Iron-works, while (as has been already noted) ſhe appears not to have ſhifted ſo much

as

a one Bolt, or received any considerable Re-
pair of other Iron-work within the whole
first years of her being Sheathed with Lead,
with which concurrs the case of the *Foresight*,
whose new sett of *Rudder-Irons*, put on in *Jan.*
1672. when unsheathed, were shifted in little
more than a year and an half, *viz.* in *Aug.*
1674. when being Sheathed with Lead, she
continued without any supply of Rudder-Irons
till 1679: Nor do we think it would conduce
a little to the satisfaction of your Lordships,
upon this very head to require a just account
of what has been lately observed in the Ran-
sacking even of a sheathed (that is to say a
Wood-sheathed) Ship of his Majesty's, where
under the protection of such sheathing, Ships
Iron-work has been reckoned the best secured
against Corrosion; yet even in this case will
your Lordships find upon the forenamed *Hap-
py Return*, the greatest part of her *Iron-work*
eaten to pieces, and particularly her Bolts
from Stem to Stern.

This Company therefore being in no kind
desirous that his Majesty should be under any
Obligation, of serving himself with their In-
vention, longer than it shall appear as safe to
his Service and Ships in this particular of Iron-
work, as it has proved it self *Superiour* to that
of *Wood* in every other circumstance, and they
being to that purpose most willing to have the
same determined by the *difference* that shall be
found between the *Charge* his Majesty has been
at for Iron-work for any number of years
forward upon unsheathed, or Wood-sheath-
ed Ships, and those sheathed with Lead, where

the work thereof in their ſheathing and ſince forth has in other reſpects been performed but with the ſame ordinary care, and obſervation of the common practice of the Navy.

They come now to offer to your Lordſhips that which (and which only) can give you full, eaſie, and uncontrollable account of the *Truth* in this matter, namely, Your *Order* to the *Officers* of the *Navy*, for their directing a thorough and impartial *Inſpection* to be made into the *Books* of the ſeveral *Yards*, with a particular Account drawn thereout, of what new Rudder-Irons, Bolts, *&c.* have been for ten or twelve years laſt paſt furniſhed to each of his Majeſty's Ships, mentioning the Names of the ſaid Ships, and diſtinct times of each their ſupplies, diſtinguiſhing alſo between ſuch thereof as were *wholly*, and that were but in *part* ſupplied with *new Rudder-Irons*, and mentioning (in the latter caſe) how many, and which of the ſaid Irons they were; with a Report of the reſult thereof to be made to your Lordſhips as ſoon as it ſhall be prepared, and mutually accorded to (for its *Truth*) between the ſaid Officers, and this Company, who have nothing more now to add on this Subject, than the obſerving to your Lordſhips, that had it pleaſed the Officers of the Navy to have contributed their furtherance to the ſearching out the *Truth* in this *Cauſe*, with a zeal equal to what this Company have, to the beſt of their underſtandings ever endeavoured to expreſs towards it, this work (no more than that relating to the *Smith's*) had been at this

day to do, they having made the same overture to the Lords and them, touching this Expedient of *examining* their *Books*, at the same time with the other in 1678. and prevailed at length with the said Officers to give Orders to the several Yards suitable to this Proposal; but with what success, we humbly leave your Lordships to receive your satisfaction from *themselves*, whose producing the Returns thereof from the Yards, (if made) would at one view have helped your Lordships to what must be owned by the Officers of the Navy, for the only, secure, clear and effectual means of *determining* this *Controversie*, without either creating to your Lordships, or continuing upon themselves and us, the trouble attending this tedious method of Dispute.

But, *My Lords*, that while we speak of *tedious*, we may render what we are now doing, as little so to your Lordships, as the Matter put into our hands, and our Desires after his Majesty's and your Lordships Satisfaction will permit; we shall now betake our selves to the last *Article* of our purpose in this Paper, namely, the opening so to your Lordships a no less certain view of a *Cure*, as we hope to have now done of the true means of right discovering the *Disease*: For, my Lords, however astonishing the *Gentlemen* of the *Navy* seem to make it, that Ships abandoned to all the above mentioned neglects, and even arts of ruine, should in length of Time arrive at such a state of weakness, as to be suspected in their being able to support themselves above water; We cannot but hold it

it a Subject much more fit for *Wonder*, t
they who under the Lord High *Admiral*,
by the Crown made the first and prin
Curators of the Health and Safety of its S
should not only content themselves for se
years together, in joyning with the Cry a
an *Evil*, they describe in Terms so fri
without making in all that time any one
fer, or seeming step towards its Remedy,
publish to all the World a *neglect*, c
and *endeavour* of *Discouraging*, and even
withstanding whatever was proposed to
purpose by any others, as may appear,

(1.) From their open patronizing ever
the Objections and Difficulties that this
vention has from the beginning had to co
with, though so *groundless*, that not on
them is now thought fit to be remembred
this their Report to your Lordships In
on, after the Complaints made against it.

(2.) From the manifest Industry where
(when time was) they laboured to expo
by an application of it upon the *Eagle*,
serving themselves at her return, with
success of their so doing, towards veri
their former declaiming against its suffic
cies, *viz.* The Condition it now came
in upon this Ship all cracked, and rent
Stem to Stern; whereas the *ingenuity* of
dealing with us in this particular, had
misfortune of being first discovered by
KING himself, upon a personal view he
pleased to take thereof, and his therein ob

the said Ships being by *age* become so ...ll, as to be brought home by her Com... with her whole Body woulded about ... *Hawsers* for preventing her very sides ...g out, and Bottom dropping into the Sea.

...)From their violation of every of the *Orders* ...fore mentioned of his Majesty, and Lords of ... *Admiralty* relating to this Affair, one forbid... (above nine years since) the use of any other ...hod of Sheathing, than this of Lead, without ...al *Order*; whereas the contrary has been pra...ed by them in many Instances. *Another*, for ...ir sheathing *two Ships*, one with *Lead*, the other ...wood, in express order to a Proof to be made ...n some difference in Opinion between them...es and one of their own number) touching ... good quality of their *Rudder-Irons*: *A Third* ... doing the like to the *Norwich*, with Directions ... employ such Rudder-Irons thereon, as should ... provided by this Company: And a *Fourth* ...culcated within few dayes by a *Fifth*) for...ding the whole use of any other Rudder-...ns upon Lead-sheathed Ships, than of this ...mpany's furnishing: But with so little re...d ever paid to the same, that rather than ... Order, or even the most Essential *Rules* ... the *Navy* should stand in the way of their ...ejudice to this *Invention*, they have taken ...on themselves the sending into the mouth of ... *Worm* no small number both of Men of ...ar, and others of his Majesty's Ships *naked* ... their Hulls, without any security against the ...orst effects thereof; which, what they have ...en, your Lordships will more properly be inform-

informed in, upon their Return home and [illegible] seeking from the Officers of the Navy, [illegible] from this Company; some of whose Experience nevertheless, and what present Advice they have received from abroad, will justify their saying thus much before hand, that the Effects will be found of many times more Charge to the King than all that the Complaint now before your Lordships concerning Rudder-Irons can be made to amount to.

But, (My Lords,) As these Proceedings have not heretofore, neither shall they now discourage this Company from a free Discharge of their Duty, by opening whatever Conceptions of theirs they think reasonably grounded towards the Remedying as well a Right understanding the *Original* of the Evil laboured under, and a Remedy both Obvious, Easie, Effectual, and next to being of no Charge, we take our selves to be Masters of, and shall lead your Lordships to the concurring with us in it, by the few steps, or Reflections following, *viz.*

First, That the only competent and allowed *Defence* of Ships against the *Worm*, before this of *Lead-sheathing*, was the paying the Hulls from the Waters edge downwards with *Stuff*, and laying the inside of a Sheathing-board (from inch and quarter to three quarters thick) all over with *Tarr* and *Hair*, to be brought over the forementioned Stuff, and being well nailed, *Graving* or *Paying* the outside of the said Board all over with another Composition of Brimstone,

Hair, Oyl, and other Ingredients, which is called *Wood-sheathing*.

Concerning which, however united the Opinion of us *English* Men may be thought to have been touching the same, it seems to this Company grounded not so much upon the real Perfection thereof, as the *Profit* that attends it to the *Builders* interested in the working of it; and consequently, leaving them under no temptation, either to look out for a *better* themselves, or give encouragement to any discoveries made towards it by others.

And that indeed the so universal Reception given to *Wood-sheathing*, is rather due to this, than its own real sufficiency, your Lordships will be Judges of, from the following Notes.

1. That if not the most, at least the most essential of all the *Ingredients* employed in that Method of *Sheathing*, are of *Forreign growth*; which we make use of not so much for the sake of the Nationality of its Argument, (though yet that is such as the Parliaments of *England* have ever laid great weight upon in all their Deliberations upon Trade, and particularly in the *Act* relating to this very Invention,) but from a Consideration which the *Books* of the Navy sufficiently confirm the force of, *viz.* That being *Forraign*, such has sometimes been the *scarcity* thereof here, (even when their use has been most wanted,) that they have been either not to be had at all, or at Prizes much exceeding the ordinary Market.

2. That

2. That the said *Wood-sheathing* hath been always observed and confessed to be very apt to gather Filth, and of no less *uneasiness* when *fouled* to be thoroughly *cleansed* again.

3. That from its roughness and the multitude of Nail-heads standing out from the Ships sides or otherwise, Ships sheathed with *Wood* have ever been complained of, as lessened thereby in that only quality upon which our *Friggats* most value themselves, and have their Service in preference to others calculated from, namely, That of their *Sailing*; for proof of which, your Lordships have not only the Evidence lately mentioned of the Navy Officers choosing to send *naked Ships* to the *Streights* when with as little violence to practice and order, they might have sent them so sheathed; but that general application, which was heretofore made to his *Royal Highness*, then Lord High Admiral of *England*, by the Flag-Officers and Commanders of the Fleet, designed under Sir *Thomas Allen* (as we remember) against the *Turks*, advising, that as his Majesty would expect any success of the said *Fleet* against that People, he would let his Ships go with all their virtue of *Sailing* about them *unlessened* by *sheathing*, as being (from former Experience of the *Turks* out-doing us that way) taught, that without this, nothing was to be hoped for of Advantage to be gained upon them; which Advice of theirs was urged so pressingly, and justified so fully, that both his *Royal Highness*, and the then Officers of the Na-

vy

concurred with those of the Fleet, (in the Council thereupon given his Majesty, and afterwards pursued) rather of exposing the *Hulls* of his Ships to the worst Effects of the *Worm*, than hazard the loss both of their whole Service, and his own Honour by *sheathing*, and thereby disabling them in this their best quality of *Sailing*.

Secondly, Which being so, and that therefore besides these plain and important *Imperfections* in *Wood-sheathing*) the only *Remedy* hitherto thought on, has been to deliver up his Majesty's Ships to the mercy of the *Worm*, by sending them abroad wholly unprovided of any Fence against them: This Company takes leave in the next place humbly to recommend to your Lordships the *requiring* from the Officers of the Navy an impartial *Account* of the *condition* wherein the Ships of that Fleet of Sir *Thomas Allen's* brought home their *Hulls* notwithstanding all the mighty professions then made by their *Commanders* of the *care* that should be taken in the frequent turning up of their Bottoms, and use of the long *Scrubbing-brushes*, then first devised and introduced into the Navy for the easier reaching towards their Keeles in the making of them clean.

And for whatever issue your Lordships are to expect from the late Liberty taken by these Gentlemen of doing the like on other Ships at this day, though it be yet too soon for your Lordships to expect any certain Account thereof, as being a Matter not to be done before they

they are brought in and searched; Yet we cannot think it will be reckoned any ill meaning for your Lordships to frame your Expectations by therein, to consider the single case of the *Rupert* in her last Voyage to the *Streights*, under Captain *Herbert*, which Ship in lieu of being according to the Kings Order fenced with *Lead*, was by the said Officers Advice and the Undertaking of her Commander for the frequency of her cleaning, sent away naked (saving in her Keel, which was *Leaded*) with this success, that besides the Apprehensions Captain *Herbert* was under concerning her even while in the *Streights*, upon what was then discovered relating to the *Worm*, putting him upon thoughts (had it been practicable) of shifting her *Garble-Brake* there; The Officers of the Navy are well able to inform your Lordships, that (notwithstanding all the promised care of Captain *Herbert*, and their own presumptions thereon) it will be no small charge to his Majesty to make good the damage she brought home by *Worm-eating*.

What then remains after this that has been said, and lies so easily within your Lordships *proving*, touching the *Imperfections* of both these Methods of *Sheathing* Ships with *Wood*, and exposing them to Sea without any Sheathing at all, but the waiting for some *Fourth*, not yet heard of, or continuing this *Third* under debate, of Sheathing with Lead, to which nothing is so much as pretended to, in Objection by the Officers of the Navy themselves, but this of its supposed Influence upon *Iron-work*, as very well knowing, that

no room is left for the least such Pretence
any one head of what has been ever sug-
ed to the contrary, especially in those par-
lar points of *Imperfections*, wherein that of
sheathing, and sending of Ships abroad
eathed, appears (as before) to remain yet
geable; *England* being never to be suppo-
unfurnished with Lead, as bearing it with-
own Bowels; Nor any Complaint hi-
o heard of, either of its being in any de-
so apt to *foul*, or difficult to *clean* as *Wood*,
lastly, so much as one suggestion ever
e of its injuring Ships in their quality of
ling; but so much the contrary, that we
ready in all humility to make our Appeal
his Majesty himself, whether the *Harwich*
in her *Lead-sheathing*, Anno 1677. under
n *Killigrew* to the *Straights*, and hurri-
out from *Chatham* under the disadvantage of
being so much as Tallowed, suffered any
g from her said *sheathing*, in her virtue of
ling; or did not outgo all (both Ships and
tchs) that were then attending the King with
in his passage to the Westward.

But of what satisfaction can this (say the
icers of the Navy) be, if one *Evil* superi-
to all those *Good* qualities (for so they
derstand this about the *Iron-work* to be) re-
ins unremoved?

To which, (My Lords) we come now to
swer, and in so doing to open to your
dships what this *Company* takes to be the
st natural, easie, and thorough *Remedy* thereto,
n though it were *possible* (as they believe,
d doubt not upon proof of what is here

said

ſaid of your Lordſhips believing alſo, (tho' it is not) that this ſuggeſtion of the *neſs* of *Lead* to *Iron-work* were true.

And this your Lordſhips may pleaſe to from us in theſe few following conſidera

1. That after all the noiſe that has made of the *damage* ſuſtained by the King this untimely conſumption of his Ships *der-Irons*, his full charge for a whole ſ them for a Ship of each of thoſe Rates which *Sheathing* is ordinarily uſed, *viz.* a *Third* Rate downwards, will not one another exceed the values following, *viz.*

Rate.		First coſt.			Value of Returns.			Clear
For a Ship of the	3	15	10	0.	5	13	0.	9
	4	9	18	0.	4	4	0.	5
	5	6	4	0.	2	10	0.	3
	6	4	10	0.	2	2	0.	2

2. That according to the *Report* of the Navy Officers themſelves, with the *Schedule* *Complaints* attending it, and what has been ſerved by us therein, it is evident that *ſhorteſt Time* to be ſuppoſed for the ordi *duration* of *Rudder-Irons* in *Lead-ſheathed* Ships two years and an half, or three years, in which time no Ship of his Majeſty's was ever known, or can be ſuppoſed to want opportunity of *Grounding* or *Docking*.

3. That (beſides the other great advant

...neſs which *Lead-ſheathing* muſt be own...
...have above that of *Wood*) the *Prices* in
...*Table* (were they of ten times the value)
...ld not bring the *charge* of *Rudder-Irons* to
...equality of conſideration with the *Evils*
...recounted in both the other methods of
...hing with *Wood*, or not *ſheathing* at all.

And that therefore in the laſt place, for-
...ch as univerſal conſent and practice al-
...the laying them with *Tarr* and *Hair*
...*Lead*, to be a certain ſecurity to Ships
...*works* under water againſt *Ruſt*, at leaſt
...ſo much as concerns their *Bolts*: And that
...fore the only thing we ſeem now to be
...re for, is the *ſupplying* the Conſumption
...may happen during the Voyage in their
...*r-Irons*, which (were freſh ones in the
...) no Ship (as is already ſhewn,) can at
Grounding or *Docking* want opportunities
...ing by ſhifting them; what then (in one
...) can be more demonſtrable than that a
...*Set* thereof ſent to Sea with every *Lead-*
...*ed* Ship (anſwerable to what is daily done
...terials of much greater charge, and for
...of leſs conſequence) is a no leſs eaſie than
...y and *Effectual Remedy* to all the damage
...can be apprehended incident to a Ship up-
...this head of *Rudder-Irons* in any Voyage not
...eding five or ſix years continuance.

Nor (may it pleaſe your Lordſhips) do we
...this as a new Reſort whereto this *Report*
...e Navy Officers may be thought to have
...en us at this day; Foraſmuch as it is no
...e than what in the ſame Terms this *Com-*

pany

pany proposed in the year 1678, to the
Lords of the *Admiralty*, and the Officers of
Navy, when upon the like considerations
urged, their Lordships were pleased not
to *approve* it, but by their expres's *Order* of
12th of *April* in that year, to require the
Officers (amongst other things) to re
from this Company such *Rudder-Irons* as
be by them provided, upon a Proposition
had then made of furnishing his Majesty's
sheathed Ships with that Commodity, not
for their present use at the time of their
ing, but for a *Reserve* to answer accident
ring their Voyages.

Which *Order* (if executed) must have
agoe with little charge, and less trouble,
an end to this clamorous *Evil*, (wherever
ause of it should at length have been found
lye) and would (by preventing the g
mages his Majesty is supposed to have
ed from it,) have furnished the said O
with a much better Expedient of te
their regards to the King, and his Ser
Their Duty to your Lordships, and the
your Predecessors; Their heedfulness to
Established Methods of the *Navy*, and
own parts declared therein: And lastly,
good will to these the humble *Endeavours*
early *Proposals* of this *Company* for the Ser
of his Majesty on this occasion, than
by their own *Failures*, first not to prevnt
Damages, next to *prolong* them, and
to *complain* of them.

CO

COMPLAINTS.

Account of the Defects of Majesties Ships which have been sheathed with Lead.

Navy Office 20. Dec. 1682.

...hed 1671, Tallowed at *Portsmouth*, 6 ... 1677, and the Pintels and Gudgeons ... Rudder-Irons (which were all new a- ... year and an half before, and the Ship ... of Harbour since) very much eaten ...sumed, and not to be trusted at Sea, ... a short tripp, and the *Swiftsures* that ...ed at the same time, her Rudder-Irons ... sound, and not in the least consumed, ... much longer on. See Sir *John Kemp*- ... Letter, *June* 1677.

Dread-nought,

vide *Answ.* *pag.* 12.

... was again haled on Shore to clean, 8 *Octo.* ... and her Bolts found totally eaten away, ... as the Spikes and Iron-works of the ..., so that they were forced to Plugg up ...-holes, and spile the Spike-holes, there ... nothing left in them but dirt, and new- ...ork must be drove before she can go to ... See Sir *R. B's* Letter 8 *Oct.* 1682.

Obs. *This Sheathing had continued on eleven Years.*

...thed 1672. in *October* 1677. the great- ...mber of her Bolts under water (under the

Lyon,

4. *Answ.* *pag.* 13. the Lead Sheathing) found very much corroded and eaten, insomuch that some of them were gotten out by the Caulkers with their Spike-Irons. The Spikes and Nails also under the Lead-sheathing almost eaten to pieces, the like whereof the Officers at Portsmouth say, they never found in any Ship not sheathed with Lead, although their Iron-work had been drove twice as long. All her Bolts drove new about five years before. See the Officers Certificate, 6 *Octob.* 1677.

Rose,

5. *Answ.* *pag.* 14. *Obs. This different decay cannot happen from the same Cause, viz. the Lead-sheathing.*

Sheathed 1674. In haling her on shore to clean in 1682. the two lower Pintells and Gudgeons of the Rudder-Irons quite eaten off, and the third almost off, so that the Rudder was found to be unhung. See Sir *R. B's* Letter, 21 *September*, 1682.

Harwich

5. *Answ.* *pag.* 11.

Sheathed 1675. upon the Careening about *February* 1675. &c 6. the Iron-work found much eaten with Rust about the Stern, especially the Rudder-Irons, imputed to the Copper Nails that fasten the Lead-sheathing. See Sir *R. Narborough's* Letter 20. of *February* 1676. Being in the Dock, *Anno* 1677. her Rudder-Irons, Stirrups, Staples, &c. found very much corroded and consumed, and rendred unserviceable. Like the *Nonsuch's* Rudder-Irons, &c. (being at the same time in the Dock) very good and firm, although she had them on several years before the *Harwich*. See Sir *John Kempthorns* Letter, *April* 16[illegible]. Upon her cleaning *September* 1682. all the heads of the Bolts found eaten away on both

as well thoſe as the Ragg-bolts eaten away
thing, and ſo alſo the Rudder-Irons, ſo that
muſt have Bolts drove on both ſides before
go to Sea, and have new Rudder-Irons.
R. B's Letter, 24 September 1682.

thed in October 1676. her bottom was James
d in February 1677. in Livorne mould, Gally.
the Lead found all cracked in every Seam
one end to the other, as bad or worſe
the Eagle, when ſhe came from Guinny,
her Rudder-Irons eaten clear aſunder, her
der-Irons were there mended, and in Offo-
llowing her Rudder new hung at Tangier,
Irons being all again eaten in pieces. See
John Wyburns Letter and Account; ſhe was
ired at Woolwich in December 1679. and her
ſheathing ſtript off, the ſame being crackt
veral places, and the Rudder-Irons being eat-
by the Ruſt, were forced to be ſhifted. See
Shiſhes Letter December 15. 1682.

But it ſeems not ſo as that any worm entred, againſt which Sheathing is only intended.

v. *Anſ.* p. 15

eathed 1676. Sir John Narbrough in July Charles
, writes, That the Rudder-Irons were de- Galley,
ve, ſo that he muſt ſend her home the en-
Winter. See his Letter July 30. 1678.
ſtripping off her Lead-ſheathing, Anno v. *Anſw.*
, her Rudder-Irons under water found ſo pag. 15.
decayed, that ſhe was ſupplyed with
ones, likewiſe all the Bolt-heads under
, in the but-ends of her Planks quite
off, and moſt part of the heads of the
der-bolts, and the Bolts in the Scarfs of
Keel and Stern. See Mr. Shiſhes Letter
ber 15. 1682.

Sheathed

Plymouth. Sheathed 1677. Sir *Fo. Narbrough* being her in *July*, 1680. writes, that her Rudd Irons begun to be much eaten with rust, that he believes he must be forced to her home that Winter. See his Letter, *ly* 30. 1680.

vid. *Answ.* pag. 11.

Fore-sight. Sheathed 1674. upon stripping her Shea ing off, all her Rudder-Irons under Water much decayed, that she was supplyed w new ones, likewise all the Bolt-heads u Water in the but-ends of her Plank q eaten off, and most part of the Heads o Ryder-bolts, and the Bolts in the Scarfs o Keel and Stern.

vid. *Answ.* pag. 30.

King-fisher, Sheathed 1677. stript off in *Nov.* 1680. her Rudder-Irons under Water found so much decayed, that she was supplyed with ne ones; likewise all the Bolt-heads under Wa ter in the but-ends of the Plank were q eaten off, and most part of the Heads o Ryder-bolts, and the Bolts in the Scarfs o Keel and Stem, all the Rings that were cle ed on the ends of her Bolts were eaten and the ends, and the reaching of the S crackt every seam of her from the rung-hea upwards, so that upon a Survey of the Sh wrights, the Sheathing was ordred to be ken off. See Mr. *Fo. Shiftes* Letter, 15 *Dec.* 1682.

Wool-wich. Sheathed 1677. repaired in *July* 1681. the sheathing taken off, by reason the Plan

defective under Water, and the Rudder-
so much eaten with ruſt, they were for-
to unhang the Rudder, and new hang it

Sheathed, *Octob.* 1677. ſhe had a new ſet of Aſſiſt-
dder-Irons 27 Months after the former, be- ance.
very much eaten, and the Lead was forced
e cut away in many places, for the ſeams
crackt, ſhe is now in want of another
of Rudder-Irons. *See Mr.* Jo. *and* Tho.
Letters, 15 Decemb. 1682.

Sheathed in 1672. in her Voyage from *Tunis* Henriet-
Tripoly, her Rudder wrought it ſelf out of ta.
Irons, hanging only by the uppermoſt Pin-
the Irons were very much decayed, and
ends of the Pintels eaten away, they made vide *Anſw.*
ſhift to hang it again, Flemiſh Faſhion, ſecu- *pag.* 13.
it with a Top-chain; after that, when ſhe
at *Marſha*, her Rudder was unhung again,
the Irons ſhifted, and when ſhe came to
to carreen, the Rudder was had on
, and fixt with new Irons, and 4 or 5
Stirrups put to ſecure the falſe Keel: Up-
the Ships being in the Dock at *Chatham*,
7. the Rudder-Irons under Water were *Stript* 1678.
d very bad and much eaten, and waſted
, but the Braces and Gudgeons very † good
ſerviceable, moſt of her Bolts under Wa- † *All muſt be equally decayed, if the Lead-ſheathing were the Cauſe.*
alſo found in a very bad Condition, being
ewiſe very much eaten and waſted. *See*
nificate from the Officers at Chatham, *Apr.* 20.
78.

Mary.

Sheathed 1672. in 1677. her Stirrups both afore and abaft of the falſe Keel found quite eaten and unſerviceable, as alſo the Staples are quite decayed; the Pintells much eaten with ruſt, and too ſmall for the Gudgeons. *See Officers at* Portſm. *Certificate*, Apr. 20. 1682.

v. Mr. *Medbury's* Letter. p. 78.

Note. There were only Eight of theſe Ships complained of by the Navy-Officers when they made their Report 28 Oct. 1682. but they having afterward given in this Scheam of Complaints to the Commiſſioners of the Admiralty 20 Dec. following, to do them right, this laſt is Printed: To ſome of which no Anſwer is given, as wanting opportunity to enquire, or not thinking it neceſſary, the Anſwers to the reſt, with what is hereafter ſaid in the Certificates, ſufficiently proving the *conſtant inequality* of the *Iron-works duration* on all Ships, (ſome of the Lead-ſheathed Ships Iron-work laſting much longer than others, and alſo than others ſheathed with Wood) ſo that the Lead-ſheathing can be no ways chargeable with the decays in the Iron-work.

The Lords Commiſſioners of the Admiralty having read the foregoing Reply to the Officers of the Navy's Report, thought fit by one of them, a Member of the Privy Council, to lay the ſame before that Board, who being attended by both ſides, upon hearing were pleaſed to make the Order following, *viz.*

At

At the Court at White-Hall,

Decemb. 22. 1682.

Preſent,

The KING's moſt Excellent Majeſty in Council.

IT is this day Ordered by his Majeſty in Council, that the whole Matter contained in the *Report* of the Officers of the Navy to the Right Honourable the Commiſſioners of the Admiralty, this day read at the Board, and the *Anſwer* thereto from Sir *Phi. Howard* and Company, relating to the Sheathing his Majeſty's Ships with Lead, together with the other Paper likewiſe delivered and read, from the Officers of the Navy; and what other Matter was further mentioned by them in Diſcourſe upon the ſame Subject, be *Referred* to the ſaid Commiſſioners for executing the Office of Lord High Admiral of *England*; who

upon the full and distinct Examination of the same, and Hearing of all Persons concerned therein, are to make their Report upon *each Article* thereof in Writing to this Board; with particular regard had therein to the shewing the *differences* of *Charge* that has attended his Majesty, whether in *Iron-work* or otherwise upon the *Hulls* and *Rudders* of the several Ships that have been sheathed with *Lead*, and those that within the same time have been either Sheathed with *Wood*, or sent to Sea *Unsheathed*. And if upon Examination it shall appear that *Lead-sheathed-ships* do sustain greater damage in their *Iron-works*, than those Sheathed with *Wood*, or *Not* Sheathed at all, what the same is truly to be imputed to; whether to their *Lead*, *Nails*, or what other *Cause*. In all which the said Commissioners are to report to this Board the *Truth* of the *Fact*, as the same shall upon *Examination* appear to them, with their *Opinion* touching the same, and what upon the whole Matter may be most for His Majesty's Service to

be

done therein, with relation to the ...ing or continuing the said Me-...od of Sheathing.

Francis Gwyn.

Hereupon Sir *Philip Howard* and Company ...ther applyed themselves to the Lords Com-...ioners of the Admiralty in their humble ...orial following, *viz.*

To the Right Honourable,

The LORDS,

His MAJESTY's Commissioners,

For executing the Office of

Lord High Admiral of *England*.

The Humble *MEMORIAL* of

Sir *Philip Howard* and Company,

Interested in the

Manufacture and Invention

OF

Milled-Lead.

Shewing,

THat His Majesty and my Lords of the Council having (out of the same Consideration of its Importance to the King, which led your Lordships first to the laying it before them) been pleased by their *Order* of 22 *Decemb.* last to Referr back to your Lordships the Business in Controversie between the Officers of the Navy and this Company touching *Lead-sheathing*:

: Theſe are humbly to acquaint your
dſhips that as we are, and ſhall at all times
ready to anſwer any Commands which you
ll think fit to direct to this Company in re-
ion thereto; ſo do we hold our ſelves bound,
Right no leſs to his Majeſty and your Lord-
ps than our ſelves, to remove a Prejudice
ich the ſaid Officers did lately offer at the
ing (before his Majeſty in Council) a-
nſt what we had then, and may yet have
ther Occaſion of ſaying in this Debate, by
ggeſtion of our being governed by Conſi-
rations of *Self-intereſt*, while *themſelves* would
thought removed above all ſuſpicion of any
er End herein than that of *His Majeſties*
vice.

In *Anſwer* whereto we ſhall only crave leave
ay, That as to that Unintereſtedneſs ſo pre-
ded to by them, it is too manifeſt, that their
taining from your Lordſhips a ſuddain Con-
mation of this Method of *Lead-ſheathing*, is
only Expedient they have for preventing
Effects of that Enquiry (which the Wiſdom
His Majeſty and the Lords of the Council
e been ſo pleaſed to recommend to your
dſhips) into the particulars of our Anſwer,
ding your Lordſhips to the ſeveral Failures
Duty and breach of Orders reflected on
by us in relation to this Affair, and the
judices ſuſtained therefrom by his Ma-
y.

And for what concerns the *Self-intereſt* ſug-
ted to lye on our ſide, we ſhall only Note,

1. That under all the Discouragements and Oppositions our Invention has for two Years together been treated with by them, they never have given them nor our selves the trouble of making one Complaint to his Majesty or your Lordships concerning them, saving what has been extorted from us in our necessary *Reply* to their late *Report* to your Honourable *Board* on this Subject; nor in the whole four Years last past (wherein they have for ought appears both without, and contrary to *Order*, taken upon them the Exercise even *that*, which is the very Matter of the present Controversie, namely the Advisableness of laying aside the use of *Lead-sheathing*) have we ever made one Application to them for removing or so much as enquiring into the Reason of their so doing.

2. That had there been the least sollicitude on our parts after our private benefit, it would have easily prompted us to a much greater observedness of Style than your Lordships find us using on this occasion towards the said Officers, upon whose *good-will* alone the success of ours, and all other Contracts with the Navy, is well known wholly to depend: Nor does this *Company* need to appeal to any other Evidence than your selves for the Fidelity of their Proceeding in this Matter towards his Majesty, in preference to any thoughts of private Advantage, after that Declaration under our Hands, wherewith we Prefaced our very first Paper to your Lordships on this Occasion;

not

not only of our Consent but Desires, that *No Considerations relating to the Interest or Right of the Company, might stand in the way of whatsoever His Majesty and your Lordships should think fit for his Service to determine concerning it.*

3. That (besides the many other Advantages accruing to His Majesty from this *Invention*) the saving of his Treasure will we donbt not in your Enquiry be found concerned in a no less degree than that † of 60 *l.* or a much greater Sume *per Cent.* through the whole of his Expence of *Lead-sheathing* compared with that of *Wood*, or sending Ships to Sea Unsheathed: upon which Consideration, and of the good husbandry the present State of his Majesty's Treasure, seems in so particular a measure at this time to call for; as also for our fuller Discharge against the Consequences of any Mistake that may attend the issue of a Debate of such Importance to the Royal Navy of *England*, we do on his Majesty's behalf humbly pray, and must take leave to insist upon with your

† 60 per Cent. *was thought fit as encouragement enough to be mentioned, though Mr.* Pepys *who also penned this Memorial with Sir* Ant. Deane *and Mr.* Hewer, *found by their Calculations the King had and might save by the use of this Sheathing above* 150 per Cent. *besides the great benefit of securing the Hulls of his Ships against the Worm, without hinderance to their sailing: Their Calculations the Publisher hath in Mr.* Hewer's *Hand-writing by him.*

Lordſhips, not only that the Contents of our late *Reply* in this Cauſe may receive your due Conſtruction and Examination with reſpect to what we have therein, and do ſtill alſo touching the True Cauſes and Remedy of the Evil in Controverſie about Ships *Iron-work*: But that whatſoever your Lordſhips ſhall in Order to his Majeſty's Service (which alſo we again deſire your having any regard to) find Cauſe of requiring further from the ſaid Officers on this Subject, may be mutually tranſacted between us in Writing, and not otherwiſe: In which we ſhall endeavour to acquit our ſelves with all faithfulneſs and Duty to his Majeſty, and no leſs ſubmiſſion to your Lordſhips, as becomes

My LORDS,

Your Lordſhips, &c.

The Lords of the Admiralty's Commiſſion being determined, before they had proceeded to make any Report herein, and King *Charles* the ſecond taking in to himſelf the Office of *Lord High Admiral of England*, which was tranſacted by his Brother, Mr. *Pepys* being Secretary, and Sir *Anth. Dean* and Mr. *Hewer* (the one always a profeſſed Friend to the Thing, and the other not only ſo, but to that time a Partner alſo for a twelfth ſhare in the Work) being made *Commiſſioners of the Navy*, the Mill'd-Lead Company could not but expect their

Lead-

Lead-sheathing would soon be *restored* by the
wer of these Gentlemen, they having through-
Examined the Matter, and informed them-
ves of the *great Benefit* and *Advantage* this
eathing had and might bring to his Maje-
's Service, as hath been shewn, and by the
ll they were in, it now becoming their Du-
also, so that they did not much press their
ork, waiting only to be called for, as
on as it should be thought convenient; but
uch time being lost under these Expectations,
length Complaining of this Delay to their
e Partner, Mr. *Hewer*, he advised them (not
Petition the *King* as they intended, but)
present a *New Proposal* to the *Board* to do the
Work per Yard square, without any Reflection
Notice of the former Proceedings, saying,
ey that had been against it, must needs be
nvinced of their mis-information which had
used the Prejudices they had formerly con-
ived against *Lead-sheathing*, the whole Mat-
being so clearly stated, and this Sheathing
well vindicated in the Company's Reply
hich they had had so much time better to
amine and consider of, and that they would
ke this way of application to them well, and
u needed not to doubt the better and speedier
ccess. Wherefore the 20 *Decemb.* 1686. the
ompany presented the *Proposal* following,
hich they leave still before the *Navy-Board*,
hopes at one time or other they will find
ason and leisure to take the same into fur-
er consideration.

To

To the Honourable

The Principal

Officers and Commissioners

OF HIS

MAJESTY's NAVY.

A Proposal of Mr. Kent *and Partners concerned in the Work of* Mill'd-Lead, *to Sheath his Majesty's Ships with the said Lead, for preservation of their Plank against the* Worm, *which way of Sheathing is plainly much* better *for* Sayling, cheaper *and more* durable *than any other way hitherto used.*

IT is humbly offered to your Consideration, that when this way of *Milling Lead* for *Sheathing* of Ships was first invented, it was immediately communicaed to the late King, and

and his preſent Majeſty then *Lord High Admiral of England*, and the Uſefulneſs of the *Invention* by them well weighed and conſidered, and thought to be of ſuch conſequence, that his Majeſty gave the *Inventors* encouragement and advice to lay the ſame before the *Parliament*, where, after a moſt ſtrict ſcrutiny into the Matter in both Houſes, they obtained in the Year 1670. an *Act of Parliament*, with Terms in it highly expreſſing the good Opinion they had conceived of this *Invention*.

After which by his Majeſty's particular direction it was firſt tryed upon ſeveral of his own Ships; but the intereſt ſeveral Perſons (trading in the Materials formerly uſed in *Sheathing*) had to oppoſe this *Invention*, did make them very induſtrious to raiſe Objections againſt it, all which being throughly examined by his late Majeſty, and a View by him in Perſon made of the Ship *Phœnix* after two Voyages to the *Streights* with the ſame Sheathing, it pleaſed his Majeſty by his Order of 20th. *Decemb.* 1673. to ſignifie his pleaſure that for the future *this* way of *Sheathing* and no other ſhould be uſed upon his Majeſty's Ships, by the then Lords of the Admiralty, in theſe words, *viz.*

After our hearty Commendations; in purſuance of his Majeſty's Pleaſure ſignified to us by himſelf, at this Board; That in regard of the many and good Proofs which had been given of the uſefulneſs of Sir Philip Howard *and Major* Watſon's *Invention of Sheathing his Majeſty's Ships with Lead, in preference to the*

doing

doing of it with the Materials, and in the manner anciently used, and with respect had no less to the charge thereof, than the effectual securing the Hulls of his Majesty's Ships against the Worms, his Majesty's Ships may for the time to come be sheathed in no other manner than that of Lead, without special Order given for the same from this Board: They are to authorize you to cause this his Majesty's pleasure herein to be duely complyed with. And so we remain

Your Loving Friends,

Anglesey.
Ormond.
G. Carteret.

And after two Years further experience, the then *Navy-Board* thought it for his Majesty's Service to *Contract* with the Mill'd-Lead Partners for the Materials to sheath his Ships at the Rates expressed in their Articles of Agreement during their whole term of their Act of Parliament. And thus stood the Matter 'till the close of the Year 1675. at which time (as we humbly conceive, by the Artifice of the interested Traders) was raised a Clamour never heard of before, as if *this* way of *Sheathing* did occasion a more than ordinary *Decay* of the *Rudder-Irons*.

This immediately put the Partners upon a strict enquiry into the Truth and validity of these Objections, and it was not long e're they fully

diſcovered that this decay in the Iron-work proceeded not from the contrariety of the Nature of *Lead* with the matter of *Iron*, but that the *Iron-work* laſted or decayed, as it was better or worſe mixt and wrought by the Smith, for ſuch *different decays* as are charged could never proceed from one common cauſe: His late Majeſty himſelf was convinced that there was no ſuch corroſive quality in Lead, having conſulted the Perſon in *England*, the moſt skilful in thoſe matters. Mr. *Boyle*.

Furthermore, Univerſal Practice both in his Majeſties Yards, and Merchant Builders has and does at this day make *Lead* the common ſecurity of *Iron-work* againſt Ruſt, not only by covering therewith (upon all Ships unſheathed, and deſigned for long Voyages) the *Iron-work* about the Rudder, but by *capping* the heads of their *Bolts* under water with pieces of *Lead* laid to and nailed over the ſaid *Bolts*.

Nor is this all, for at this day whatever Merchant Man, or Man of War is appointed for a Voyage, where the *Worm* eats, the back of her *Stem-poſt* and beard of her *Rudder* are ſheathed with *Copper* or *Lead*, and this even where the Ships alſo are ſheathed with *Wood*, the *Eaſt-India* Company it ſelf, (upon whom we may beſt depend for Cautions wherever preſervation of Ships is in queſtion) not omitting in that very caſe to ſheath their *Rudders* with *Lead* or *Copper*, which practice certainly could never have prevailed with our Fathers, and been followed with ſo continued a conſent to this very day by us, of the vicinity of either of theſe Metals, aſſiſted (as is by ſome imagin-

imagined,) by salt-water, had been ever found so pernicious and certain ill effect upon the very matter they are employed to secure.

Nor does what is thus approved of in the general and universal practice of *England* want Confirmation by the like of Forraign Nations, to wit, the *Dutch*, *Portuguese's*, *Spaniard*; the first of which like us do generally sheath their *Rudder-Irons*, and the back of their posts with Lead or *Copper*, upon all Ships bound in the way of the *Worm*; and for the two latter, not only the Rudders, but the whole Bodies of their Ships under water, even of the *Gallions* themselves, have of long time been, and are well known at this day to be entirely sheathed with Lead, which concurrence of these two latter Nations, seems in this case so much more considerable than any other, by how much not only their Voyages are the longest, their hazards therein from the *Worm* the greatest, and Cargoes the most valuable of all that Navigation knows, but for that the *Hulls* of their Ships abound the most with Iron-work, as having all which in the fastening of our Plank is performed with *Wooden Trunnels*, done by them with large *Spikes* of *Iron*.

In fine, were this spoil of Iron-work chargeable with nothing but what is contained in the *Lead* and *Nails*, these pretended effects of theirs would be *constant* and *uniform* in all Ships alike sheathed; whereas nothing is more frequent than the instances of their *Inequality*, and this Company dare put the whole Credit of their Cause upon that one Issue, *viz.* of ever finding an equal Consumption of the Iron-work

work under water, whether upon the same or different Ships at any one time, or equal distances of time: The complaint of Ships that have passed this way of sheathing affording a most ample proof of this *inequality*, by having some of them loaden with Complaints, and every one different from the rest, and at different times from it self, whilst we are yet to be told whether the rest are not (as we are sure by the long lasting of the *Iron-work* some of them were) free from all ground of this Complaint, and upon Information of several *Masters* of Ships and other Sea-faring Men, even upon Ships that were sheathed with Lead, or not sheathed at all, they have found the Rudder-Irons of some to decay much sooner than others, which they alwayes imputed to the Smiths different mixture, welding and working of the Iron.

To justifie therefore the goodness and usefulness of this their Invention, the Partners in the Year 1678. made a *Proposal* to the then *Navy Board*, to furnish the *Rudder-Irons* for the Ships they should sheath, in which they would take care themselves of the good mixture, welding and working thereof, which Proposal was thought so reasonable that upon it several repeated Orders to that Board were made by the Lords of the Admiralty.

Thus stood the matter in the Year 1678. about which time some differences arose amongst the Partners themselves, which gave an interruption to their Proceedings, and an opportunity to those whose Interest it was

(by

(by reason of their respective Trades) to decry this *Invention*, though it was apparently of so great advantage to the Kings service; but at present all differences being reconciled, and the Interest in the *Act* of *Parliament* fallen into such hands as are both willing and able to set it on foot, they thought it their Duty to lay a *new Proposal* before your Honourable *Board*, which they do the more gladly, for that they know you all to be Persons throughly acquainted with, and skilful in these Matters, and most Zealous in the Profits and Interests of his Majesty.

They crave leave to begin with reminding you of some Arguments, which no doubt have formerly lain before some of you, of the *advantage* that will accrue by the use of this way of sheathing above that of *Wood*.

First, That the only competent and allowed defence of Ships against the *Worm*, before this of *Lead-sheathing*, was the paying the *Hull* from the waters edge downwards with *Stuff*, and laying the inside of a sheathing board (from inch and quarter to three quarters thick) all over with *Tarr* and *Hair* to be brought over the forementioned stuff; and (being well nailed) *graving* or *paying* the outside of the said Board all over with another composition of *Brimstone*, *Oyl*, and other Ingredients, which is called *Wood-sheathing*.

Secondly, Concerning which, however united the opinions of us *English* men may be thought to have been touching the same, it seems

ms to this Company grounded not ſo much
on the real perfection thereof, as the pro-
that attends it to the *Builders* intereſted in
working of it, and conſequently leaving
m under no temptation either to look out
a better themſelves, or give encourage-
nt to any diſcoveries made towards it by
ers.

And that indeed the ſo univerſal reception
en to *Wood-ſheathing* is rather due to *this*,
its own real ſufficiency, you will be Judg-
of from the following Notes.

1. That if not the moſt, at leaſt the moſt eſſential of all the Ingredients, employed in that method of *Sheathing* are of *forraign* growth, which they make uſe of not ſo much for the ſake of the Nationality of its Argument, (though yet that is ſuch as the Parliaments of *England* have ever laid great weight upon in all their Deliberations upon Trade, and particularly in the *Act* relating to this very *Invention*) but from a conſideration, which the Books of the *Navy* ſufficiently confirm the force of, *viz*, That being *Forraign*, ſuch has ſometimes been the ſcarcity thereof here, (even when their uſe has been the moſt wanted,) that they have been either not to be had at all, or at Prices much exceeding the ordinary Market; whereas the *Materials* uſed by the Copartners are of the *Product* of *England*, and ſo can never be wanting.

2. That

2. That the *Wood-ſheathing* hath been alwayes obſerved and confeſſed to be very apt to gather *filth*, and of no leſs uneſſineſs when foul'd to be throughly cleanſed again.

3. That from its *roughneſs*, and the multitude of Nail-heads ſtanding out from the Ships ſide, or otherwiſe, and the *thickneſs* of the *ſheathing* it ſelf, Ships ſheathed with *Wood* have ever been complained of as leſſened thereby in that only quality, upon which our *Friggats* moſt value themſelves, and have their ſervice in preference to others calculated from, namely, their *Sailing*.

All theſe Arguments they humbly hope have given you full ſatisfaction of the preference this way of ſheathing ought to have, and likewiſe hope they have anſwered all Objections to it.

They crave leave therefore to begin their *new Propoſal* with theſe Aſſertions.

1. That this ſheathing with Lead, at the firſt hanging on, is, if at all, very inconſiderably dearer than a good *Streights* ſheathing with *Wood*.

2. That the *Wood-ſheathing* never laſts above a Voyage or two, and when ſtript the old ſheathing is worth little or nothing.

3. That

3. That this *Lead-ſheathing* with ſome ſmall repairs will preſerve the Plank from the *Worm*, (which is the true intent of ſheathing Ships) till it ſhall be required to be ſtript off for Calking, or other reparation of the Hull when that ſhall be neceſſary, but will never need ſtripping for any defect in the ſheathing it ſelf; and when it ſhall be ſtript, the old ſheathing being *Metal*, will yield its value to melt down again.

To reduce this Work to a certainty of great and undeniable Benefit and Advantage to his Majeſty, they offer as followeth.

1. THat the Ships ſides being prepared (and the *Bolt-heads* and *Braces* parcelled or ript as they ought) to bring the ſheathing on, they will ſheath the ſame with their *Lead* and *Nails* according to the Pattern now produced, which is near 3. *l.* to the foot ſquare, in any of his Majeſties Yards (convenient Room being aſſigned them to ſtore their Goods) and defray all charge of Materials, Carriage, Workmanſhip, and waſt at the rate of 11. *s.* 9. *d. per* Yard ſquare, which upon due enquiry will appear to be very little more than a good *Streights* ſheathing, and not above half ſo much as an *Eaſt-India* ſheathing.

2. To

2. To keep the ſame in conſtant repair, they offer to deliver on board convenient Stores of *Lead* and *Nails*, to ſupply Accidents if any happen in a Voyage, for which the *Carpenter* may be anſwerable, and as often as any of the Ships they ſhall ſheath ſhall return home from their Voyages, any wiſe *damaged* in their ſheathing, they will be obliged, upon notice given when they are Dockt, to repair the ſame, and ſo from time to time to keep the ſaid ſheathing in good and conſtant repair at the rate of 10. *l. per Cent. per Annum.* according to each Ships *firſt Charge* of ſheathing, as *long* time as they ſhall deſire to have the ſaid *ſheathing* continued on to the time of *ſtripping*, and then to allow for the old Lead 11. *s.* per hundred weight, whereas the *Wood-ſheathing*, which ſeldom laſts above a Voyage, when ſtript yields nothing.

If any doubt yet remains, that this ſheathing is the cauſe of a more than ordinary *decay* in the Rudder-Irons, they do offer, if they may have the making the Rudder-Irons themſelves for ſuch Ships they ſhall ſheath, they will undertake the ſame at the Kings Rates; and to prevent all ſuſpicion of hazard, while Ships are in their Voyages, they will at firſt ſheathing provide two ſetts of Rudder-Irons to each Ship, one to be in ſtore alwayes on Board to ſhift if occaſion requires, and thoſe not to be paid for till it ſhall appear that the firſt have laſted as long as the Rudder-Irons of other Ships uſually do; and when the *Lead-ſheath-*

Sheathing is thereby sufficiently vindicated from the fear of being any wise destructive to the *Rudder-Irons*, they may be made by the same hands they now are, again.

All which is humbly submitted to your Consideration.

10. *December* 1686.

LETTERS

LETTERS and CERTIFICATES From the KING's Master-Builders, Carpenters, &c. On behalf of the Lead-Sheathing.

Sir Anthony Dean's *Letter to Sir* Francis Watson.

January 22. 1669.

SIR,

"THe Patterns of Lead you shewed me of "4 *l.* to the Foot square, is absolutely "of great advantage to his Majesty, being "very fit for the Uses of the Navy, and will "serve for Furnaces, Sea-store, Caps for "Bolts, heads of Masts, and the like: And the "Pattern of 3 *l.* and under is very fit to nail "under Knees, Standards, Carved-work and "Double-work, and would not do amiss for "Sheathing,

Sheathing, if Nails can be found to laſt, which I thought convenient to be particular in mentioning as well the ſize and weight as its Uſes, to ſatisfie thoſe who may be concerned.

Anthony Dean,
Maſter-Builder at *Portſmouth*.

Portſmouth.

THeſe are to Certifie whom it may concern, that the Mary and Lyon having been both on ground at Portſmouth, we did view the Sheathing upon the ſaid Ships, which was done at Chatham in the Year 1672. and do find it lye on exceeding well, the Salt-water having not eaten either the Lead or the Nails in the leaſt as we can diſcern. Mary. Lyon.

Dan. Furzer,
Maſter-Builder.
Feb. 2. 167$\frac{3}{4}$. *Rog. Eaſtwood*,
Aſſiſtant.

Chatham.

THeſe may Certifie whom it may concrn, that the Ships whoſe Names are mentioned in the Margent, were ſheathed with thin Lead at his Majeſty's Yard at Chatham, prepared and made after the New Invention, the Mary having been out in the Dock ſince ſhe was Sheathed, her ſheath- Lyon. Henrietta. Mary.

ing lay all very firm, smooth, and good as when first put on, and very clean; and I am of Opinion that the Lead made after this new Invention, being so close pressed, smooth, and equal in all parts, it is much more useful for Shipping, and cheaper than the Lead cast after the usual manner, this Lead after this new Invention being fit for all uses about a Ship, it being made to weigh 3, 4, or 5 l. to the Foot square.

Phin. Pett,
Master-Builder
at Chatham.

Chatham-Dock,
Feb. 25. 167$\frac{5}{6}$.

Woolwich.

Phœnix.

March 10. 167$\frac{0}{1}$.

Dreadnought.

June 1671.

Whereas his Majesties Ships the Phœnix *and* Dreadnought *were above three years since sheathed by Major* Watsons *new Invention with thin Lead, and at their Returns after several forreign Voyages being ordered into his Majesties Dock at* Woolwich, *and committed to my care to search the condition of their Hulls; upon view thereof I do hereby certifie, (notwithstanding the fears the said Sheathings might have been prejudiced by the Cables, lying on ground, or some other Accident) That their Sheathings did continue very firm and fast, without the least damage from the first doing thereof, the* Phœnix *particularly having then made two Voyages into the Screights, was since sent a Voyage into* Guinny *without any Amendment.*

Furthermore

Bristol.

Furthermore, His Majesties Ship the Bristol being in the beginning of April last ordered under my Charge to be sheathed, I sheathed her with the best sort of Lead and Nails in less than three months time, and the whole charge thereof upon the nicest Computation I could make, did amount to the sum of 8. l. 4. s. which is as little as she could possibly cost for an ordinary sheathing of Boards of one inch, well nailed. This I could no less than subscribe under my hand.

Apr. 1674.

Phin. Pett,
Master-Builder
at Woolwich.

April 2. 1674.

Sheerness.

Henrietta.

Phœnix.

These are to Certifie, That about nine or ten dayes since his Majesties Ships the Henrietta and Phœnix, which are sheathed with Lead, were haled on Shore at his Majesties Yard at Sheerness, the said Ships coming in thither from lying in the Channel, the latter having made a Voyage into the Streights; and that I found the sheathing of the said Ships very firm and good, and not at all damnified by the ranging of the Cables on the side, or by rubbing on the ground, or otherwise.

John Shish,
Master-Builder.

April. 2. 1674.

Phœnix. THese are to Certifie, That I was Carpenter of his Majesties Ship the Phœnix, in her Voyage from the West-Indies, or Barbadoes, in the Year 1674. Captain Atkins Commander, as we were coming home in a storm of Wind, receiving our fore course the Rudder snapt off, the waters being worm eaten quite through, the lower part was away all the eyes of the braces under water except one, and so sunk, the upper part hung (which I hung over-board, and took off, unto which I fastened Planks to make a Rudder as well as I could; the reason of the Rudder being lost, was by the Worm eating it in pieces.

The Rudder not being sheathed high enough, no fault in the Rudder Irons nor Lead-sheathing.

Edward Ledger, *Carpenter.*

Kingsfisher, THese are to Certifie, That I Edw. Wright was entred Cooper on board the Kingsfisher, about four months before she was sheathed with Lead, and that her Rudder Irons (as I was informed) were put on her at Woodbridge about a year before, the Ship having afterwards lain in Chatham River till I entred, and I was on board her above two years and a half, at least two years in the Streights, Captain Trotter Commander. That she had none of her Rudder-Irons shifted all that time except one Pintel, which was broke, and amended at Legorne, and at her new Voyage when he left her about a year and a half agoe, she shifted none of her said Rudder-Irons. That in the said Voyage they did many times clean the said Ship as there was occasion, which kept clean much better than a Wood-sheathing: And when they had occasion in three

*ree or four months time or thereabouts, as they
ad opportunity, they uſed to Careen her with her
ats, and in half the time and trouble, with
ittle bruſhes, provided for that purpoſe, they uſed
clean her as they had formerly done their board-
athing, with which* Jo. Ward *her Carpenter,*
d Robert Bodenham *her Boatſwain, now in*
Streights, *were ſo much pleaſed, that they
uld often fall into commendation of that new way
heathing, and the eaſineſs of keeping it clean,
d the great advantage thereby to the Ship in its
ailing.*

Edward Wright.

Novemb. 22. 1682.

Aſſiſtance.

*WE, whoſe Names are underwritten, Carpenters, employed about the ſtripping the
ill'd Lead-ſheathing of the* Aſſiſtance, *at her coming into Mr.* Caſtles *Dock at* Deptford, *to be
aired in* September 1686. *do hereby Certifie
ſaid ſheathing lay on very very well and whole,
any galling by the Cables or rubbing off on
nd, preſerved its Plank ſmooth and ſound, from
Worm eating as at firſt laying on, which was
ut ten years ſince.*

Feb. 3. 1686.

Will. Bowerman.
John Rumney.

A Letter from the Master-Builders Assistant at Deptford, *formerly Master-Caulker at* Portsmouth.

SIR,

Mary.

Plymouth.

Dreadnought.

"AFter my hearty Service presented to you, "These are to acquaint you that I had "answered your Letter e're this time, only I did "think it convenient to see how the *Mary's* Bolts "proved at *Woolwich*, which I now understand "are very bad; these Bolts have been drove 13 "or 14 Years, which could not be expected any "better than they be, but the Plank is very "good, and so was the *Plymouth's* and *Dreadnought's*, and not the worse for the Worm except where the Lead was off, and that not "worth speaking of, but all Ships (as far as I "see) the Plank proved as good as those which "were sheathed with Board: As to the Bolts "and Braces, I dare engage they may be secured in parcelling of them, and the Ships which "were sheathed with Lead very tight, when the "work was very open under the sheathing.

July 4. 1680.

Zach. Medbury.

A

A Letter from the Maſter-Builder of Portſmouth *to the Lord* Churchil.

My LORD,

IN Anſwer to your Lordſhips Letter, my Opinion of Lead-ſheathing is, That it is the fineſt and cleaneſt Sheathing in the world, and as for the deſtruction of the Bolts; I ſay when well parcelled, no defect can come from the Lead-ſheathing; for I have made it my obſervation, That where the Bolt heads are carefully parcelled (as they are or ought to be in a Wood-ſheathing) no defect is found, but where that is neglected, the water getting between the Bolt-head and the Lead, there both the Lead and Iron are uſually decayed: But I find that his Majeſties Ships in ten or twelve years are generally Iron-ſick, whether ſheathed either way or not ſheathed at all, by reaſon of the build water. And as to the Rudder-Irons, I find that the Pintells decay ſooneſt, but that an unconſtant and unequal decay in the ſaid Iron are in all Ships, is moſt certain, ſheathed or not, and according to the goodneſs and well working of the Iron, ſome prove of longer durance than other, the ſoon decay I cannot impute to the Lead-ſheathing, but if ſuch decay were, hanging the Rudder Flemiſh Fashion, 'tis eaſie to unhang the ſame, and upon ſuch decay to hang on new ones, the Brazes being much more durable than the Pintells: And as Wood-ſheathing requires to

" be ſtript once in three years, where the
" Worm eats, ſo my Opinion is, that a Lead-
" ſheathing ought to be ſtript once in ſeven
" years, by reaſon of the Ochams decaying in
" the Seams; (the which would lye on much
" longer, and be firm, were it not for ſuch
" decay) and as to its fouling, it fouls nothing
" near ſo ſoon as a Wood-ſheathing, and when
" foul is eaſily cleaned with bruſhes, or Scra-
" pers if barnicled, with very little trouble,
" it will alſo endure a handſome fire to dry
" the ſame if occaſion requires; and when
" this Sheathing is ſtript, the Plank is no-wiſe
" damaged by the Worm as we ever found:
" This I hope gives your Lordſhip full ſatis-
" faction from

Your Lordſhips, &c.

July 4. 1687. Iſaac Betts.

A Letter from Sir Phineas Pet, *Commiſſioner at* Chatham, *to my Lord* Churchil.

My LORD,

" IN Anſwer to your Lordſhips Letter, de-
" ſiring my opinion of the Lead-ſheathing,
" and the Complaints that ſome have made a-
" gainſt the Rudder-Irons and Bolts of ſeve-
" ral of the Lead-ſheathed Ships, I return your
" Lordſhip this general Account following,
" which I ſuppoſe will give your Lordſhip
" full

"full ſatisfaction. While I was his Majeſties "Maſter Builder here at *Chatham*, it fell into "my way to ſheath and ſtrip divers of thoſe "Ships, by which I had opportunity enough "to make full obſervations, as well in re-"ſpect of the Iron-work as ſheathing; and I "muſt confeſs after I had ſeen ſome of thoſe "Ships return from their Voyages, as the *Ly-*"*on*, *Henrietta* and *Mary*, with their ſheathing "firm and ſound, free from the Worm, and "very clean, I look'd upon this ſheathing as "a very happy Invention for his Majeſties "Service, to have his Friggats thus ſecured "from the Worm, without hinderance to their "Sailing, which a thick Wood-ſheathing muſt "needs be; and by reaſon of its duration, the "charge that was ſaved in Graving, and the "value of the old ſheathing (being Mettal) "when ſtript muſt needs be conſiderably cheap-"er to the King, and I am of the ſame Opi-"nion ſtill, though I have heard divers Com-"manders and others ſay, this Sheathing is "an extraordinary decayer of the Iron-work, "which they may fancy by taking notice only "of ſome particular Ships that perhaps may "have had their Rudder-Irons laſt a ſhorter "time with a Lead-ſheathing, than they have "obſerved ſome other Ships that have been "ſheathed with Wood, being not acquainted "with the ſearching and repairs of Iron-work "in Ships of all kinds as Shipwrights are; for "this great inequality we conſtantly find in "the laſting of the Rudder-Irons, and other "Iron-work in all Ships, whether ſheathed "either way, or not at all, may not be known

"to them, which we always look upon to
"come from the Smith, in the better or worſe
"mixing, welding, and working his Iron:
"Nor can I imagine how the Lead-ſheathing
"ſhould be any cauſe of the great decay in
"Iron-work, for we uſe in Wood-ſheathing
"to Capp the Bolt-heads with Lead, and ma-
"ny times to ſheath the Rudder-Poſt, and
"Beard of the Rudder with Lead. And for
"the Nails, their Heads are ſo thin and ſmall,
"that I do not ſee how they ſhould continue
"ſo long in the ſides of a Ship, (as ſome of
"theſe Ships have been ſheathed,) and at ſtrip-
"ping appear not at all to be diminiſhed in their
"ſubſtance, and yet communicate ſuch a cor-
"roding miſchief to the Iron-work as ſome
"would have it; but if ſuch a thing were,
"well parcelling the Bolts would ſecure them,
"and the Rudder-Irons can decay in no Voy-
"age ſo faſt, but by having a freſh ſet always
"on Board, opportunity may be found time
"enough to ſhift them, which would very
"well be contrived, rather than to loſe ſo many
"other great Benefits that Lead-ſheathing
"brings with it to his Majeſties Service as
"well as to the Publick. This is I think the
"ſubſtance of what your Lordſhip would be
"ſatisfied in; and if you deſire any thing more
"particularly, you may command

Your Lordſhips moſt, &c.

April 12. 1688. **Phin. Pett.**

PURSERS

PURSERS Certificates for the Goodness of Sheathing-Lead to line the *Bread-rooms.*

THese Certifie, That the Bread-rooms of his Majesties Ship Royal Catherine being lined with Lead, did very well preserve the Bisquet, insomuch that during the term of her Voyage 1672 and 1673. there was not any Bisquet damaged. R. Catherine.

Jacob Bryan.

THese are to Certifie, That his Maiesties Ship the Fairfax Bread-rooms were lined with Lead about two years since, and that the said Bread-rooms was Bread for nine or ten years, which during the said time was not removed, or stirred, and was at the expiration of the said time as good as when it was first put in, and received no damage by wet or damp to the prejudice of the Bread. Fairfax.

Jan. 24. 1674.

William Rivers.

SIR,

YOu having a desire to hear how the leading of the Bread room of the St. David, was a pre- St. David.

preſervation of the Bread, I do aſſure you, that if it had not been for the leading of it, it would not have laſted half ſo long; for I was two years in the ſaid Ship, and the very laſt of our Bread did hold out to be as good as the firſt.

Jan. 5. 167½.

Wilm. New.

Happy Return. THeſe do Certifie whom it may concern, that the Bread-room belonging to his Majeſty's Ship the Happy Return are lined with Lead, which Lead hath for eight Months together preſerved the Bread from any Damage without being ſtirred, and it was in as good Condition as at firſt putting in.

Feb. 23. 167½.

Maur. Linch.

R. Prince. THeſe are to Certifie, that the Bread-room of his Majeſty's Ship Royal Prince being lined with Lead, did very well preſerve the Biſquet, inſomuch that during the laſt Voyage betwixt 1 May, 1673. and 24. Octob. following, there was not in the term of the ſaid Voyage any Biſquet damaged.

Triamer Pickſtock.

Theſe

THese are to Certifie, that the Bread-room of his Majesty's Ship St. George, *being seeled with Lead, did preserve and keep our Bread in very good condition the whole time that she was at Sea.* St. George.

Sept. 10. 1674.

David Willis.

Perhaps it may be acceptable to some Readers, to have a glancing and shorter View of the *Company's Answer* to the Officers of the Navy's *Report* and Complaints to the Lords Commissioners of the Admiralty against the *Leadbeathing*; and therefore it is thought fit that the Reader be entertained therewith, as the same was also drawn by the Pen of that ingenious Person Mr. *Pepys*, viz.

Novem: 30. 1682.

A BRIEF OF THE Controverſie

Depending between

The Officers of the NAVY,

AND

Sir *Philip Howard* and Company,

TOUCHING

The late Invention and Practice of Sheathing his Majeſty's Ships with LEAD.

SIr *Philip Howard* and Company, Intereſted in the Manufacture of *Mill'd-Lead*, and Contraction for the ſame with the *Officers of the Navy* for the uſe of his Majeſty, being ſurprized with a late Report to the *Lords of the Admiralty* from the ſaid Officers in prejudice of this Invention, did (in right to his Majeſty and his Service, no leſs than to it and them-

emſelves) preſent their Lordſhips this Day
ith a *Reply* to that *Report*, containing an am-
e Deduction and State of the whole Mat-
r, whereof the following is an Abſtract:

Shewing,

THat this Company becoming Maſters of
the ſaid Invention, *Anno* 1670, they in
he ſame Year ſubmitted it (as a Matter of pub-
ick Import) to the Examination and Cenſure
f *Parliament*. Where after paſſing the moſt
olemn and ſtrict Methods of Inquiſition in
oth *Houſes*, it received their Approval and
Confirmation, by an Act granted to that Effect,
n Terms moſt Expreſſive of their ſatisfaction
n it, and Intentions of Encouragement to its
Inventors.

After which, it was by his Majeſties Com-
mand immediately put in Execution, firſt up-
on the *Phœnix*, and then ſucceſſively upon o-
ther of his Ships. But not without continued
Induſtry and Combinations employed againſt
it, by Perſons intereſted ſo to do, until by a three
years proof of its Efficacy, in contradiction
to all that had been objected againſt it, and
more particularly from the ſatisfaction his Ma-
jeſty received concerning it, in his perſonal
View and Obſervation of its ſucceſs upon the
Phœnix; he was pleaſed to put an end to the ſame
in the Year 1673. by an Order from the then
Lords of the Admiralty, ſolemnly eſtabliſhing
this Method of ſheathing, in Excluſion to all
that had been till then uſed in the Navy.

Not-

Notwithstanding which, the said *Officers* thought fit to take yet two *Years* more for its Probation, (in all *five Years*) before they would make it the *King's*, by entering into any *Contract* for it with this Company: Which then (*viz.* in the Year 1675.) they did, and that not only with a Condition of securing the benefit of it to his Majesty for *Twenty Years* to come, (which was the whole Term the Company had then remaining in it) but an expres Declaration of their entering into this Contract, *Upon sufficient experience had of the goodness and usefulness of this Invention, both as to the Lead and Nails.*

All this nevertheses not sufficing against the Private Interests concern'd to expose it; a new Exception was soon after rais'd, upon the score of a Pretended Discovery made of some Occult Quality in the Lead, by which the *Rudder-Irons*, and other Iron-works of his Majesties Ships under water were said to be in an unusual Degree eaten and corroded with Rust.

Upon which his Majesty and the *Lords of the Admiralty* did by several and repeated *Orders* in the Months of *April* and *May* 1678. not only recommend and press upon the Officers of the *Navy*, the making a strict Enquiry into the General Truth, and Natural Ground of the Evil so complain'd of; but upon a reasonable suggestion then made by this Company, of its being rather chargeable upon some Defect in the *Iron-work* it self, than ought to be apprehended from the Lead, They were pleased to direct several *Ships* to be expressly fit-

ted,

and, and other things done by the ſaid *Officers* in conjunction with this Company, in order to the better diſcovery of the Truth in that particular; but without any regard ſhewn either to thoſe *Orders*, or to the Importance of their Contents to his *Majeſty*, by any thing that appears to have been done towards it by the ſaid *Officers*, from that very day to the Date of this *Report* in *October* laſt, wherein (upon the ſingle ſcore of its ſuppos'd Influence upon *Iron*,) they take upon them peremptorily to Adviſe againſt the further uſe of *Lead-ſheathing*, without any other Evidence of the Truth or Ground of that their Suppoſal, than what is to be inferred from a Particular thereto annex'd, of the Decays of *Iron-work* obſerv'd upon ſome of the *Lead-ſheathed* Ships.

The invalidity of which Inſtances being ſeverally opened by this Company, with reſpect no leſs to their Truth, Conſiſtencies, and Cogency, than to their Diſproportion in Number to thoſe of the like ſheathing, againſt which nothing of Complaint has been ſuggeſted by them; The Company proceeds to ſhew,

I. That the ſheathing of Ships with *Lead*, neither is nor can (as ſuch) be the Cauſe of any decay in *Iron*: And this,

1. From the Univerſal Conſent of Perſons of the moſt allowed Knowledge in the *Theory* and Operation of Metals.

2. From the Univerſal *Practice* (both Ancient and Modern) of the *Shipwrights* of *England*,

land, in their ſpecial Application of Lead to the preſerving of *Iron-work*.

3. From the like Practice in *Forraign Nations*.

4. From their Obſervations touching the unequal growth of Ruſt upon *Iron-work*, within the ſame or different ſpaces of Time, and on the ſame or different Ships, however *ſheathed* or *unſheathed*.

II. That the Real *Cauſes* to which alone this extraordinary decay of the *Iron-work* is of right to be imputed, are,

1. The want of due *Inſpection* to the performance of the *Smiths* Work.

2. An induſtrious *Omiſſion* (in the particular Caſe of theſe Ships) of the Principal Point of Care uſed both in his Majeſties and Merchants Service, in the preparing of all Ships deſigned for ſheathing.

3. An Unaccountable *Continuance* of the ſheathing upon the Bodies of theſe Ships, beyond what the Practice and Rules of the Navy, in the caſe of any ſuch Neglects can juſtifie.

III. Laſtly, That an Enquiry into the *Books* of Iron-work in his Majeſties Yards, is the only, and would long e're now (had this Company's Advice been purſued) have been found an effectual and certain Expedient for the coming to a right deciſion of this Queſtion.

Which being ſaid, and an Account given of the ſeveral *Obſtructions* and *Diſcouragements*, which

which both his *Majesties* Service, and this *Company* have met with from the Officers of the *Navy*, in all its Endeavours of bringing this Matter to a Satisfactory Issue to his Majesty: The Company concludes with shewing these three things,

1. That sheathing with *Wood* (the only Security for *Ships* against the *Worm*, before this of *Lead*) is, and has always been owned to be, attended with several Circumstances greatly Detrimental to his Majesty, both in his Ships and Service.

2. That the only Expedient also, besides this of *Lead*, for obviating those Evils in *Wood-sheathing*, has been the flying to another *Evil*, no less fit to be avoided than they, *viz.* That of sending the Kings Ships into the *Worms* way *unsheathed*.

3. Lastly, That therefore the only Method in reserve (yet known) for the serving of his Majesty herein, is this of *Lead*. Against which, none of the Evils in either of the former, or any other, are (after near *Twelve years* Experience of it) so much as suggested by the Officers of the *Navy* themselves at this Day, having this under dispute concerning *Iron-work*; To which, (after all) the Company closes with Proposing a most obvious, easie, next to chargeable, and effectual *Remedy*.

For the Particulars of which, and each of the foregoing Matters, reference is to be had to their *Original Paper*, lying before his Majesty and the *Lords* of the *Admiralty*; whereof this is only an *Abstract*.

HAVING

HAVING in the foregoing part of this Diſcourſe entertained the Reader with the Tranſactions that have paſſed concerning the Mill'd Lead uſed upon the ſheathing, *&c.* of about twenty Ships of the Navy Royal, I ſhall now ſet forth the great *benefit* and *advantage* accrowing from the uſe of this ſort of Lead for the covering all manner of *Buildings*, and other purpoſes where *Sheet-Lead* is employed, which the Mill'd Lead Company ſome time ſince alſo propoſed to their Majeſties Officers for *Buildings* and *Ordnance*, at rates greatly cheaper than what was or is paid (with reſpect to the work done) for Caſt-Lead, which they had demonſtrated to be much better as well as much cheaper, in a ſheet of Paper Printed and Publiſhed ſome Years ago, for general ſatisfaction, but could not prevail with thoſe Officers by all their Printing, Proofs, or Propoſals, it being againſt the Inclinations of Profit of the Plumbers and their Friends, who had Power or Intereſt enough to hinder the admittance thereof into the Kings Works, which being further proved by freſh Inſtances of Experience from Coverings of Houſes, *&c.* both wayes done ſince the Rebuilding of *London*, lately alſo publiſhed, the ſame here follows *in terminis*, for the better ſatisfaction of thoſe who have the diſpoſal of their own Money.

AN

AN

ADVERTISEMENT

To all who have Occasion to make Use of

Sheet-Lead.

ALL New Inventions (being proposed (as better and cheaper) to lay aside something before used for the same purpose) must expect to meet with great Opposition; for some particular Persons, and some Trades which consist of many Persons being concern'd in Point of Interest, right or wrong, they will decry that which is against their profit, and procure as many others as they can to do so too; this being the Case of the *Plumbers* with those Concerned in the *Milled-Lead*, whoever has Occasion to make use of *Sheet-Lead* ought not to regard what interested Persons say on either side, but to weigh and consider with himself the Reasons offered, and to examine the truth of what's said on both sides: The Mill'd-Lead Company have Printed many of their Reasons some time since, in a Paper at large: amongst which, to say nothing of its solidity, smoothness, *&c.* the *Equality* of *Mill'd Lead* alone is sufficient to prove it much better

ter, and (at the Companys Rates in proportion to the least *Inequality* that can be granted in *Cast-Lead*) much cheaper, which also may further appear from the Considerations following.

1. It is agreed by all, that if the *Plumber* could cast his Lead exactly Equal to the thinnest part thereof, it would be better than to be thicker in one place than another, so that the exceſs of thickneſs is not only unneceſſarily paid for, but it makes the Sheeet worſe, and helps to crack and cockle the thinner parts, by its ſtronger reſiſting the Sun-beams, and other Accidents of Weather, which falling equally on all parts alike, draws the thinner parts, when the thicker ſtay behind, which cauſes that Cockling and cracking therein: Wherefore, if Mill'd Lead be thicker than the thinneſt part of a caſt Sheet, it muſt be allowed to be better, and to laſt longer, and a leſs quantity of Lead being employed, it may be *cheaper* to what degree in proportion to *Caſt Lead* the Cuſtomer ſhall judge it convenient and ſufficient for the purpoſe deſigned to have the *thickneſs* of his Mill'd-Lead to be of.

2. The waſting and decay of *Sheet-Lead* being chiefly beneath by the heat and moiſture contracted between it and the plain it lyes on (turning it into White-Lead,) that accident which the *thinner* as well as the *thicker* parts are alike liable to, ſhews the great miſchief that attends a Caſt-Lead covering in this reſpect alſo.

3. Theſe

3. These particulars as well as the *Plumbers* ... pretence to near *Equality*, and endea-...ur to cast as equal as he can, shews the ex-...llency of Equality in Sheet-Lead, and con-...quently that it is so much the worse, by how ...ch it deviates from *Equality*, and this *Ine-...ality* in a sheet of Lead being an Object of ...se, any Man that has but his eyes in his ...d may be as good a Judge thereof as the ...t Architect, Surveyor or Plumber in *Eng-...d*; and if he please but to give himself ...e trouble of viewing indifferently the *Cover-...* upon Houses in *London*, since the Rebuild-..., and cut a snip from the *thickest* and *thin-...* part of the edge of any Sheet he can come ..., he will generally find *Cast-Lead* to be a ...rd, or at least a fourth part thicker, nay, ...ny times above twice as thick in some pla-... as in others, and the Coverings for the ...st part *crackt*, *cockled* and *patcht* with *Sol-...*, if they have not been new laid, as many ...e been since the *Fire*, particularly the *Roy-...* *Exchange* and *Cordwa-...-Hall* new covered four ... five Years ago; the ...*ngs Head*, a Confecti-...ers by *Ludgate*, part new ...vered about seven Years ...e, and the new as well ... the old crack'd, cock-..., and patcht with Sol-...; the *Eagle* and *Child* ... *Tower-street*, stript and ... laid in 1676. Mr. ...k's House, next the

Since the Rebuilding of the City, and the first Notice of Mill'd Lead, the Plumbers to make their Coverings seem cheaper, have generally cast much thinner than formerly, which hath produced these ill Effects in so short a time, tho in more ancient Coverings the same Inequalities and defects proportionably may be seen.

Bell

Bell in *Fryday-street*, and abundance more new *Covered*, too long here to mention; and where the old ones lye, this decay and patching generally appears: Whereas such Coverings as have been laid with *Mill'd-Lead*, some not above 6. *l.* to the Foot, ten or twelve Years ago, lye as well as at first laying, and in all probability will so continue many Years, as to instance in a few: At Mr. *Wdgllaffe's*, next the Hand and Pen in *Rood-Lane*, a Covering about 30 Foot square, with Sheets the full length; Mr. *Miners's* Buildings in the *Inner Temple*, with Sheets 22 Foot long, where a Covering of Cast-Lead by, at the same time laid, being compared, the Defects complained of will plainly appear, in *this*, while *that* continues as well as at first, at Mr. *Graydon's* House in the *Pell-mell*, and divers others too long also here to mention; besides many more in Town, and some great Houses in the Countrey done since, as Esq. *Sanders's* at *Tooting*, some Sheets 34 Foot long; Esq. *Tilney's* new House near *Rotherwick* in *Bark-shire*; Sir *James Hays's* at *Bedgbury*, and Esq. *Vane's* at *Fairlaune* in *Kent*, &c. of different kinds, worth viewing for Beauty and Imitation.

4. There are besides the *Inequality*, certain defects in *Cast-lead* that lye concealed within the Sheet, not appearing on the superficies, called by the *Plumber Blow-holes* and *Sand-holes*, which often happens in *Casting*, and must help forward the decay of those *Coverings*, which the *Mill* discovers, such *Holes* being enlarged at

the *Sheet* lengthens in *Milling*, (and not close up as they falsely suggest) and where these *Holes* or *Breaks* are met with, the Sheet is cut long enough for use; if not, all's returned again to be new Cast, so that none but *sound Sheets* can pass the *Mill* twenty or thirty times, every Sheet does before it is finished.

5. Let us suppose then the present price of *Mill'd-Lead* to be 16 *s.* a hund. and *Cast-Lead* 14 *l.* which is an *eighth part* less, whatever the *Inequality* of a Cast-Sheet shall appear to be above an *eighth part*, which is not easily discerned, so much must it be granted that *Mill'd Lead* is cheaper; but if *Mill'd Lead* of 7 *lib.* to the foot be admitted but to be as good as the *Plumbers* pretended 9 *l.* it is cheaper at 16 *s.* the hundred than his at 12 *s.* 6 *d.*

6. Wherefore since 7 *lib.* to the foot may very well be allowed, to remove all Objections at once which the Plumbers and their friends falsly charge the *Mill'd-Lead* with, any Person (using the Plumber the Company shall recommend or approve) that shall lay a Covering with their Lead of 7 *lib.* to the foot square, they will undertake (and secure him by good Covenants as Council shall advise) to keep such Covering, not exceeding a 100 *l.* value, in good and constant repair for a term of 41 Years (to mention a time certain and sufficient) for 5 *s.* a Year, and proportionably for a greater; and if any Sheet or Sheets shall crack, or any wise prove defective in respect of the Lead it self, they will be obliged

at their own Charge (Carriage only paid for) to lay new Sheets in their room, without the patching and botching with Solder that appears upon all the *Cast-lead Coverings* in Town that have not lain half so long, at a very great Charge in *Work* and *Solder*, besides the Damage the House must have sustained thereby.

☞ *But because some* Plumbers, *and other their Friends, do pretend greater Care and Improvement in their* Casting *of late, and have offered to lay Wagers that they can Cast a* Sheet *of their full length* equal *within* one pound *in ten* [illegible] *through; Mr.* Hale, *a Partner and Manager in the Work, is ready to take any such Wager; and he will give them a* pound and an half *in ten, and lay them the price of a Fodder of Lead, that all the Plumbers in Town, and their Friends joyned to their assistance, in the way they have hitherto used of* Casting upon Sand, *they cannot do't; and is ready to enter into fair Articles with any one that shall make the Wager; though if some should be found so dexterous as to cast one or two such Sheets perhaps in half a dozen, it would not mend the matter for general use. Moreover, if this could be done, even at the rate of a* pound and an half *in ten,* Mill'd-Lead *is yet* cheaper *about Three per* Cent. *For Ten hundred weight of Cast lead would cost 7 l. and Eight hundred and an half of Mill'd Lead but 6 l. 16 s. As to the Plumbers pretence of Casting* broader, *that's not yet (according to the Proverb) as Broad as Long; for the Mill'd Lead size of Three Foot and an half being broad enough, and perhaps better than broader for general use, and they able to make their* Sheets *above*

twice

ice as long as the Plumber can cast, if need ire, to save Drips, and comply with the th of Coverings, this disadvantage is not good by any pretence of breadth saved; if great breadth are necessary, as for Coe-works, &c. may be supplied with Mill'd d, by burning a Seam joyning two Sheets to-ther.

This Mill'd Lead being to be had of any Thickss, even from one pound in the Foot to twenty, or ve if desired, must for the Reasons aforesaid be eaper and better than Cast Lead, and will ve for all uses that Cast Sheets are fit for, and thinner sorts for many more, and may be oyed with able Workmen to lay the same on urches or other Buildings, or work it into sterns, Fountains, Pipes, Vessels for Brewers, yers, Coperas-works, Dairies, &c. and Solder 6 d. a pound; also where Nailing is required ere sheathing Nails, made of a Metal that ill not rust, corrode or decay the Lead, as on does, may be had for 8 d. Hundred, at the Mill'd ead-Shop, * the Sign of e Mallard on the West side Fleet-Channel, near Holborn-bridge, or by a Note ft for Mr. Hale at the Temple Coffee-house, that he may know where to speak with the Parties, or send his Plumber to undertake their Work.

* The Mill'd-Lead-shop is since removed to the Mill'd-Lead-sign in Orange-street by Red-Lyon-Square, near Holborn, where Mr. Hale himself also now lives.

There's nothing said herein relating to the Mill'd-Lead-Sheathing; that having been discontinued in the Navy (after about twenty Ships sheathed) requiring a more large and particular Account what may have

have been the Cause thereof, the Objections, Answers, Proofs, and whole Proceedings in that matter, are intended shortly to be Printed, which will sufficiently satisfie the unprejudiced, and justifie the preference of Lead-sheathing before that of Wood in many particulars, besides Cheapness, which with regard to its Duration, and the Value of the old Sheathing when stript, will save the Owner above Cent. per Cent. *And all the noise that has been about the Rudder-Irons decay, charged on the Sheathing, proved to be frivolous, vain and groundless.*

All Merchants or others that shall buy any considerable quantity, above a Tun at least, upon discourse with the said *Mr. Hale*, may have some Abatement even from the present Prices, suitable to the quantity and payment.

LONDON, Printed for *T. H.* and are to be had at *Garraway's* Coffee-house, the *Temple* Coffee-House, and the *Mill'd-Lead* Shop above-mentioned. 1690.

Notwith-

Notwithstanding which, the Plumbers (to prevent a Contract with the Commissioners of the Navy, for which this Company had then a Proposal lying before them to furnish their Mill'd-Lead of all sizes of thickness and thinness, as well for Sheet-lead as Scuppers, *&c.* into their Majesty's Yards) gave out to them the Paper following: The Vanity and Falshood of which Paper will plainly appear to the Reader from the *Testimonies* given even by the Owners or Inhabitants themselves of those Houses from whence they raise their Instances of commending their *Cast* and decrying the *Mill'd-Lead*, divers of which are here also Printed at the Foot of their said Paper, others being Houses never covered with Mill'd-Lead at all, as the Lord *Preston's*, or with Mill'd-Lead, as the Lord *Crew's*, against which no ground for complaint of the Lead, in which Houses Servant-women only living, they could not give proper Certificates herein.

THE Plumber's Propoſal TO THE NAVY-BOARD.

Right Honourable,

'UNderſtanding, that the Perſons concerned in the Mill'd-Lead have put out Printed Papers in Vindication of the Service of the ſaid Lead, and have alſo lately made Propoſals to your Honours to ſerve their Majeſty's therewith, or any private Perſons for Covering of Houſes, Gutters, Pipes, Ciſterns, Scuppers, Liquor-Backs, or ſuch like Work, which they pretend will be cheaper and better than Caſt-Lead:

May it pleaſe your Honours,

'THe Mill'd Lead is no ways ſo ſerviceable and cheap as the ſame is repreſented, nor indeed ſcarce fit for any ſervice, as is evidently proved by daily experience in moſt places where the ſame has been uſed; that after

er it hath lain a few Years, it hath crack'd, dew'd, and rose in ridges, so that the Persons concerned, after having been at a considerable Charge in the daily patching and mending of it, have at last been forced to take it up, and lay Cast-lead in the room of it, before such time as the Houses or Places could be made tight: of the truth of which, several Examples can be given your Honours upon Oath, if required.

'That on the other side, the Cast-Lead doth plainly make appear its durance and service, for in several old Buildings about this City and *Westminster*, where this Lead hath been laid for a great term of years, yet remaineth as firm and right as when first laid: And besides, the same is cheaper and better to their Majesty, or any private person, by 20 *l. per Cent.* than the Mill'd-Lead is, according to the Rates it is now sold, which together with the strength and service is very considerable.

'Also the Solder made and used by them of the Mill'd Lead, is not fit for service, whereas all Solder used by the Plumbers is by Essay sealed according to the standing Rules of the Company.

'By what is here offered, is humbly desired may be taken by your Honours, as proceeding from Duty, and not in prejudice to the Persons concerned in the Mill'd-Lead, for notwithstanding the plausible pretences of the usefulness and service of the said Lead, and the disparagement of the Cast-Lead, yet the Plumbers have not made any like returns to dis-

'diſcredit the Mill'd-Lead, not for want of rea-
'ſons, but being aſſured that a ſhort time would
'ſufficiently make appear the ſervice and firm-
'neſs of the Caſt-Lead, and the ſleightneſs and
'the charge of the other, which is now ſuffici-
'ently evidenced, and is humbly ſubmitted to
'your Honours Conſiderations.

Places where the Mill'd-Lead hath been uſed.

His Majeſty's Horſe-guard Houſes at *White-Hall.*
The Lord *Preſton's* Houſe.
The Counteſs of *Portland's.*
The Lord *Crew's* in *Soho-ſquare.*
Mr. *Fox's* in *Arundel-ſtreet.*
* Mr. *Harris's* in *Norfolk-ſtreet.*
Sir *John James's* in *Pell-Mell.*
Dr. *Chamberlain's* in *Eſſex-buildings.*
Eſq; *Sanders* at *Tooting.*
Sir *Ant. Deane's.*

* *No ſuch Houſe to be found.*

Theſe and ſeveral others which have been covered with Mill'd-Lead, have been taken up and laid with Caſt-Lead in a very ſhort time, as may be made appear.

Ex. per W. Dale,
23 *Aug.* 1690.

COPIES

COPIES
OF
Letters and Certificates,
Proving
The *Plumber's* foregoing Paper
TO BE
Scandalous and False.

Mr. Saunders's *Letter.*

Mr. *Hale*,

I Have thought upon the Paper you shewed me, which you said the Plumbers presented to the Navy-Board, complaining of mighty defects in your Mill'd-Lead, and mentioning a great many places where they say they have been forced to strip it off, and new cover with their Cast-Lead, and amongst the rest my House at *Tooting*: I wonder much at

'their Confidence and Folly, to say such things
'that may be so easily contradicted: I assure
'you my Covering at *Tooting* lyes very well,
'and I do not doubt but it will so continue;
'indeed I am very proud of it, and I do not
'think there's a finer and better Covering in
'*England*, at least not of Cast-Lead, for I
'have Sheets thereon about twice as long as
'I ever heard the Plumber pretended to Cast,
'being [illegible] long, and I was very well sa-
'tisfied after a great deal of Discourse with
'the Plumber before I began, that your Mill'd
'Lead was cheaper in the whole Work, and
'would prove much better, and being exactly
'equal (which theirs is far from) would last
'longer than theirs, and I see no cause yet to
'alter my Opinion. Upon your request to
'have something from me in Writing on this
'Occasion, I could say no less, and suppose
'this may suffice from

28 *Aug.* 1690. SIR,

Your Humble Servant,

Robert Sanders.

Dr. Chamberlain's *Letter.*

Mr. *Hale*,

WHen I last saw you, you shewed me a Paper addressed by the Plumbers to the Navy-Board, wonderfully decrying your Milld-Lead, commending their own, and because that amongst several other places, which they say were covered with Mill'd-Lead, that in a short time (being very defective) were taken up, and new laid with Cast-Lead, they mention mine in *Essex-Buildings* to have been one; you then desired me to give two or three lines in Writing of the truth thereof, which I could not reasonably deny you; and I do here assure you that the same Mill'd-Lead which was first laid on about twelve Years since upon two Platforms at my House there, remains on still very well, free from any such cracks or flaws and ridges they complain of, which I have reason to believe would not have continued so well, if they had been covered with Cast-Lead; for that the Cast-sheets which were laid upon the Cornish next the Street before I came to the House, were afterward in many places so crack'd and cockled, that about eight Years ago, as I remember, the Plumber took it up, or great part of it, and new laid it again: I considered also of the Charge of both ways, before I made use of the Mill'd-Lead, and was

then

'then satisfied that the whole was cheaper to 'me, and would prove better than if I had 'laid in with Cast-Lead of the first the Plumber 'propoſed, and I continue of the ſame mind 'ſtill; all which I thought fit to ſay upon this 'occaſion, and leave it to you to make uſe 'thereof as you pleaſe, and am

26 *Aug.* 1690. SIR,

Your Humble Servant,

Hugh Chamberlain.

Mr. Hoy's *Letter about Mr.* Fox's *Lead-Covering.*

Mr. Hale,

'ACcording to your deſire I waited upon 'my Friend Mr. *Fox*, and acquainted him 'that the Plumbers in a Memorial by them 'preſented to the Navy-Board, had alledged 'that ſeveral Houſes (amongſt which his Houſe 'in *Surry-ſtreet* was mentioned to be one,) formerly covered with Mill'd-Lead, had been 'ſince ſtrip'd and covered with Caſt-Lead; and 'deſiring to know the truth of it, he did aſſure 'me that their Allegation was abſolutely falſe, 'for that the Mill'd-Lead formerly laid on by 'you, ſtill remains there not ſtirred, which he would

would have shewn me, but was then a little indisposed, being but newly return'd from *Tunbridge*; and the access to it being by an Engine, which would have required his Company, I was unwilling to trouble him, but will wait upon him again whenever you desire:

Sept. 1. 1690. SIR,

Your Servant,

Clement Hoy.

Mr. Lechmere's *Letter.*

Mr. *Hale*,

YOu shewed me a Paper which the Plumbers gave in to the Navy-Board, wherein they much complain of the defects of the Mill'd-Lead (boasting of the excellency and durableness of their Cast-Lead) and say, that where the Mill'd Lead has lain a few Years, it hath so crack'd, flaw'd, and rose in ridges, that after the Owners have been at great Charge in the daily patching and mending of it, they have at last been forced to take it up, and lay Cast-Lead in its room: But I doubt these Plumbers mistake the one for the other, for I know very well their Cast-Lead had all these ill qualities they complain of, for

'for upon a House of mine, where Mr. Ch
'now lives, next Door to the *Bell* in Fry
'*street*, which was covered with Cast-Lead
'the first Building after the Fire; I do rem
'that after such rising and cockling, and
'being patch'd almost all over, about eigh
'Years since the Tenant was forc'd to stri
'it, and new lay it; and I well remember I
'allowed 10 *l.* towards the charge, and I fea
'in a few Years it will be in as bad a Condi
'tion as ever, for it is already patch'd in di
'vers places; and had I had the good Fortune
'to have known time enough of your Mill'd-
'Lead, I am very well satisfied from my own
'Observation of such Places where I have since
'known it laid, and the reason of the thing
'it self, and the charge thereof (a Man
'paying for no superfluous Lead, as in the
'other you do) that I might have saved
'Money, and have had a far better and more
'durable Covering on my House than now I
'have.

'*SIR*, I am so well satisfied of the excellen
'cy of your Mill'd-Lead, and of the greatness
'of its worth for all uses beyond Cast (which
'is notwithstanding all the Care that can be
'used in the Casting of it full of great uneven-
'ness and other defects) that I could say much
'more than I have on this Subject, but I al-
'ways thought it a very impertinent thing to
'spend too much time in arguing against Tran-
'substantiation, it being maintained by the im-
'pudence of a Party that resolve they will not
'be convinc'd, and I take the only reason why
'the Plumbers oppose your Mill'd-Lead to be

'this,

this, because their Interest is concerned, and I think they are as much in the right in so doing as those Persons are in the wrong, that make use of their Cast-Lead when the other may be had.

Aug. 1696. SIR,

Your Humble Servant,

Tho. Lechmere.

Mr. Lightfoot, the Lady Portland's Steward's Certificate.

WHereas Mr. Hale did this day shew me a Paper from the Company of Plumbers, directed to the Honourable Commissioners of the Navy, wherein they had preferred Cast-lead far before Mill'd-Lead, and withall had there inserted several Persons of Quality and others, among whom was my Lady, the Countess of Portland's Name, that her House had formerly been covered with Mill'd-Lead, and since with Cast-Lead. Now these are to Certifie, that my Lady, the Countess of Portland's House neither was nor is covered with Mill'd-Lead, but upon altering the form of the Building, and making some additions thereto about Eleven Years since, she covered the back part with Cast-Lead, which still remains, but not without yearly repairing, of late occasioned by cockling

and

and rising of the Lead into a ridge, which afterwards cracks, and so are obliged to patch it with Solder, as in several Places we have since was laid on. As Witness my Hand this 30th. day of August. 1690.

Robert Lightfoot.

Mr. *Martin*'s Letter.

'YOu told me that some Plumber had lately informed the Navy-Board that the Mill'd-Lead Covering upon a House of mine in Radcliffe was very much cockled and crack'd, and that they had taken off some part of it, and laid Cast-Lead in its rooms of the truth of which, you desiring a line or two from me in Writing: I do assure you there no such thing, for the same Mill'd-Lead sheets, near 30 Foot long, that was first laid on about eleven Years agoe, lyes very well still, without any ground or cause for such Complaint; and I am so well satisfied with it, that if I had the like, or any other Occasion for Sheet-Lead, I should preferr the use of your Mill'd-Lead much before that which is only Cast.

Josh. Martin.

Sept. 15. 1690.

As

As to the Plumbers Skill and Conſcience they pretend about their Solder, notwithſtanding their hard Words and hard Mettal they uſually talk of therein to make it a Myſtery; all that are any wiſe converſant in Mettals know, that their Solder is only a Compoſition of Lead and Tyn in ſuch proportions that the ſame never ſtands them in above four-pence-half-penny a Pound, and therefore well may be afforded at their higheſt Eſſay for ſix pence, ſo that the Mill'd-Lead Company are under no Temptation of making it courſer than they; which however would be no damage to the Cuſtomer, but an injury to themſelves that work it, a due proportion of Tin being only neceſſary to make their Solder work and run the better before their Iron.

The Mill'd-Lead Company after their new Propoſal to the Navy-Board, preſented alſo the Memorial following, to ſhew the preference of their Mill'd-Lead for Scuppers, &c.

To

To the Right Honourable,

The Principal

Officers and Commissioners

Of their

MAJESTIES NAVY.

MEMORIAL

Humbly offered by the Mill'd-Lead Company, proving that their Mill'd-Lead Scuppers are better than Cast-Lead, and at least 25 per Cent. *cheaper.*

THis Company having in *January*, 1678. made a Proposal to this Board to make their Scuppers of Mill'd-Lead, one Mr. *Parsons* a Plumber they then usually employed, opposed it; pretending, that altho their Lead was not exactly equal, yet the inequality was so inconsiderable, that Mill'd-Lead Scuppers being then 4 *s.* in a hundred more than theirs, they would be much dearer to the King; whereupon the Board was pleased

used to appoint a time for hearing both
es; when the Plumber to make his Pro-
ness good, undertook his Scuppers should not
above half a pound in ten heavier than the
the Board should Order; they thereupon,
Jan. 1678. ordered each to make 36 Scup-
s of three several sizes and thicknesses, viz.
l. 10 l. and 12 l. to the Foot square; both
rs soon after sent in their Scuppers to Deptford, where being received into the Stores and weighed, the Mill'd-Lead Scuppers appeared to be conformable to the Order, and to weigh but 8 c. 1 q. 26 l. whereas the Cast-Lead Scuppers weighed 12 c. 3 q. 10 l. above one third more; which appearing so gross a difference from what the Plumber undertook, and he pretending Excuses and Servants carelessness:

The Board indulged him another Tryal upon 72 Scuppers, when he took to his Assistance one Mr. *Whitehall*, another Plumber that usually also made Scuppers for the Navy, and it cannot be Imagined but that these Plumbers now used all their Skill and Care, which notwithstanding all, though in many places they appeared to be thinner than the Milled-Lead of the sizes given, the weight of the whole 72 came to 25 c. 1 q. 12 l. whereof *Watsons* made 31, weighing 9 c. 3 q. 0 l. and *Whitehall* 41, weighing 15 c. 2 q. 12 l. whereas the 72 Mill'd-Lead Scuppers weighed but 16 c. 3 q. 10 l. about the same proportion the former were, which at the then Prizes of 3 l. for the Cast, and 26 s. per Hund. for the Mill'd-Lead Scuppers, was 27 per Cent. loss to the King; after which the Company made many

ny more; however Demands have been discontinued since. This being a matter of Fact, the truth of which may appear from the Store-keepers Books at *Deptford*, this Company hopes when you shall thus be put in mind of the great and certain loss their Majesties have and must sustain in this particular, demonstrated by Tryals that have been so fairly and fully made, your Honours will make no great difficulty of restoring this part of their Work at least to their Service.

May 19. 1690.

All which they humbly lay before this Honourable Board, for their Consideration upon the New Contracts proposed.

After all (and upon the *Surveyors* producing to the Board a piece of Lead indifferently cut out of a Cast-Sheet of 8 *l.* in the Foot square, one with another, in *Deptford-Yard*, which they owned to be not above 6 in some places) they thought fit in *September.* 1690. to Contract with the Company to supply their Majesties Yards with their Mill'd Sheet-Lead, of all sizes, of thicknesses and thinnesses, at Rates agreed; but as to the Scuppers, they were pleased to suspend any Contract for them, till they should upon a further Tryal (shortly to be made) be satisfied that they also were better for their Majesties Service than Scuppers made of Cast-Lead, saying they had had no account of the Success of the former Tryals.

A

A TREATISE OF Naval Philosophy.

In Three Parts.

I. *A Physico-Mathematical Discourse of Ships and Sailing.*

II. *Of Naval Policy.*

III. *Of Naval Oeconomy or Husbandry.*

BIBLIOTHECA BODLEIANA

The First Part,

Contains the several Sorts and Closes of Experiments *under-mentioned*, viz.

THE specifical weight of *Water*, and *Timber*, and *Irons*, as also the several Mals whereof *Shipping* is composed.

The absolute and comparative strength

of

of *Wood*, *Metals*, and *Rafts*, in their several dimensions, Figures and Quantities, and how much the *strength* of the same is *diminished* by Notches, Holes, and other Excavations, or *increased* by the Texture and grain of the said materials.

3. The *motions*, *strength*, and *matter* of the Wind.

4. The *motion*, *strength*, *course*, and *figure* of Waters, upon the surface thereof in *Rivers*, *Tide-ways*, *Currents*, and *Eddies*; as also in the *Ocean*, whether the same be spontaneous, or by agitation of the Wind.

5. Of the *Tractive* and *Pulsive* forces upon *swimming Bodies*, in respect of *strength*, *time*, proportional increase of *swiftness*, *lines of direction*, *Superficies of Resistance*, *Magnitude* of the *movent bodies*, and *impression of force* in various *Angles* of *Incidence* and Reflection.

6. Several *Hydrostatical Experiments* relating to *Pumps*, and *leakage*, according to several parts of the Ship, and depth under water, wherein the same may happen.

7. Experiment of *spinning*, *twisting* and *weaving*, with reference to *Sail-Cloath*, *Cables*, and all other sorts of *Cordage*.

8. Experiments upon *Pitch*, *Tarr*, *Rosin*, *Oyl*, *Brimstone*, *Tallow*, *Ocum*, *Leather*, &c. relating to the *Sheathing*, *Caulking*, and preserving of Vessels, and their appurtenances from the injuries of *water*, *weather*, *worms* and *weeds*, and of their *weight*, *Extension*, *Duration*, &c.

9. Of the choice *seasoning* and preparing of *Timber* and *Plank*, *Knees*, and *Thereuits*, as also of *Iron*, *Hemp*, and other Materials used in Shipping.

10. O

10. Of the particular power of *Oars*, *Wheels*, *Poles*, *draughts of men*, and *Horses*, with reference to their Actions upon Vessels, and of reducing them all to one and the same Calculation and Principal.

11. Of *sounding* and measuring the *depth* of water, and of discovering the Nature of *Ground* as to the *hold-fast of Anchors*, wear and tear of Ground-Tackle, with what else belongs to the artificial moving and riding of Ships upon all occasions.

12. *Magnetical*, *Hydrometrical*, and *Optical* Instruments and Experiments.

13. *Nautical Geography* and *Astronomy*.

14. *Nautical Staticks*, and *Mechanicks*, relating to *Pullies* and *Crows*, *Handspecks*, *Screws*, *Levers*, *Kildwedges*, *Nippers*, *Capsterns*, *Windlasses*, *Slings*, &c. in order to the Landing, Masting, Leading, Careening, and weighing up of a Ship.

15. Of *Gun-powder*, the several sorts of *Metals* for *Guns* and *Shot*; their several figures and proportions, in order to the several Effects of *Penetration*, *battering* and *direct shooting*.

16. Of several Observations upon *loading* of a Ship with *Lead*, *Wood*, *Cotton*, *Liquor in Cask*, *Corn*, *Salt*, *Frail* and *Timber*: And the Accidents which usually fall out in each of the said sorts of loading, with reference to the safety and well sailing of a Vessel.

The said *first part* containing also the *Definition* and *division* of a Ship in its several parts, together with a Selection and Description of the

the principal things and notions which are to be considered in *framing* and *fitting* of a Ship for the several uses unto which the same is designed, in manner following.

1. A Ship is understood to be all from the Keel to the *Vane*, and from the extremity of the *Boultsprit* to the *Lanthorn*.

2. The said Ship is divided into *Hull*, *Sail*, and her *Burthen*.

3. The *Hull* is considered but as one piece of Timber, and carved out of one Logg, and is divided into what is under the *upper Deck*, out of which all waters is to be excluded. And what is above the same, as *Cabins*, *Round-house*, *Caddie*, *Fore-castle*, *Coaches*, &c. which may be rather esteemed as part of the burthen of a Ship, than *Essential parts* of the same.

4. The *Hull* under the said *upper Deck* is divided into the *Cavity* or *Hold*, whether the same shall be subdivided by other *Decks* and *Bulkheads* or not, as also into the *Shell* of the said *Cavity*: and thereby into the *Additaments* affixed to the outside of the said *Shell*. Such are the *false Stemm*, *Gripe*, *Keel*, *Stern-post*, and *Dead-rising* up the *Tuck*, exeluding the *Rudder*.

5. Upon the *Shell* of the Ship, or rather of the said *Cavity*, there are to be considered the several *Lines* under-mentioned, to be drawn *parallel* to the *Keel*, (viz.)

1. The *line* unto which the *Hull* of the Ship sinks upon her *launching*.

2. The *line* unto which the whole Ship *sinks* when she is *rigged*, *balasted*, and fitted for the

bell

best advantage of Sailing, and mann'd with a sufficient Complement for that purpose, victualled with three months Victuals, and furnisht with Defensive Arms.

3. The *line* unto which she sinks loaden as a *Merchant Man*.

4. The *line* unto which she *stoops* upon a Wind of either side.

5. The *line* of *Horizontal-section* where the *first Deck*, and all other Decks and Orlop ought to be placed, and the *lines* to which the *Ports* between each *Deck* ought to be made.

In the next place is to be considered the three *perpendicular length-way sections* following, viz.

1. The section of splitting the whole Ship, Cabbin, and all other superstructures included between the *Plank-sheering*, and the *Keel*, the upper line of which section is called the Sheer of the Ship.

2. Upon the general and most comprehensive section I propound, that all the *Horizontal lines* before mentioned may be mark'd together with the *bottom line* of the Interval Cavity or Hold before mentioned.

Lastly, let there be a *transverse section* of the *Hull* at the *main bend*, within which let two other *parallel sections* be described arising from each extremity of the *Keel*.

Next to the several *Lines* and *Sections* before mentioned, it will be necessary to take Notice of the *Center of Gravity* and *Magnitude*, as well of the whole Ship comprehended between the *Keel* and the *Vane*, as of the several parts thereof, *viz.* The *Centers* of *Gravity* and *Magnitude* of

of that part which is under the water; and also of that which is above the water in the Air and Wind.

2. The same also to be observed when the Ship swims upon an uneven and unlevel Keel drooping forwards, or sending aft.

3. Consideration is to be had of that *line* which by a *Spindle* passing and fixed into the Ground, the Ship lying cross a Current when no Wind at all is stirring, would be in *Equilibrio*; also the like *line* passing through the supernatant part of the Ship would also be in *Equilibrio*, its broad side lying to the Wind in dead water.

In the next place there ought to be considered the proportion between *the way of the Ship* cut off at its greatest *transverse section*, and *the way of the same* shaped from the same section forward in the usual manner, or to his best advantage.

2. The proportion between the *resistance*, between the perpendicular *length-way section*, and outside of the Hull shaped as is usual.

3. Between the *Horizontal Section* at the *water line*, and the *bottom* of a Ship in its usual shape.

CHAP. II.

BEing thus furnished with the sixteen sorts of *Experiments* above mentioned, and with the clear and definite understanding of the *several parts* of the Ship, and of all the several *Sections*, *Lines*, *Centers*, and *Proportions of resistance* above mentioned: We then proceed upon the third

third Branch of the first *General Part* as followeth. (*viz.*) Suppose we have before us a piece of *Timber*, of equal substance, of an indefinite length, and square at both ends, we are now to consider by what process to carve out of the same the *Hull* of a Ship, which work will contain the several Considerations following.

(1.) Of what *length* to cut the said *Timber*, which at first we will suppose to be the *length of four sides* of the square, intending hereafter to debate whether the same ought at all to be *longer* or *shorter*, and in what Cases.

(2.) Suppose the said *Square* be divided into *twelve parts*, and that seven of them shall be under water when the Ship is loaden.

(3.) Dividing the *length line* into twelve *parts*, and at three of them let the two *sides* converge into an *Angle*, whose sides let be *portions of Circles* unto which the remaining strait part may be a *contingent line*, which Angle is the first means of facilitating the *Ships way* through the Water.

(4.) At four parts let the *bottom superficies* converge into an Angle, with the *Horizontal Section* above mentioned, *viz.* at the Ships greatest draught of water.

(5.) At the said Section let the sides *downwards* converge into an Angle, consisting also of *Circular Lines*. This last Angle is made for the Ships *ease of falling* into the Sea, as the two first were for its *easier passing* through it.

In the next place we must provide for the steering of water to the Rudder, which is to be performed by two other Angulations, *viz.* from

from fifteen *parts aft*, let the sides of the Ship converge into an Angle from the *Horizontal section downwards*, where the Ship draweth least water at her Launching, which will be the *height of the Tuck*, let the *bottom superficies* be bent in a *Circular line*. And thus we have in gross set down the *five Incurvations* of the bottom and sides of our Logg, and how the *butt-ends* thereof have been as it were abolished *forward on* for the *easie passage* of the Vessel through the water, and aft for the quick and effectual pulse of the water upon the *Rudder*.

In the next place we come to the like shaping of the remaining part of the *Logg*, which we intend shall swim above the water, which is performed as followeth.

Let it be supposed that the Ship upon a Wind, is to stoop upon a certain Angle, let the supernatant sides of a Ship so much *tumble* (as they call it) as that the said *sides* may remain *perpendicular* when the Ship *stoops*, which being done quite round the upper surface, the remainder will be the *shape* and *section* of the *upper Deck*.

Memorandum, That all the forementioned Incurvations are to be trimmed and repaired by reconciled lines.

In the next place we come to *hollowing* or *excavating* of our *Logg*, which suppose (beginning at the *middle*) we do (leaving equal thickness) every where until the *Logg* become so light that it swims at the line representing the *launching line*, and consequently we have now acquired the *model of a Ship* as it appeareth in her launching, except the Cabbins and

what

what is usually superstructed upon the upper Deck.

In the next place we are to consider how far *ballast* and *weight of rigging*, &c. will sink the said Ship: And secondly, how much *deep* the weight that must be added to fit out a *Man of War* will depress her, for till then we cannot rationally determine the place of the *Gun-deck*, wherefore the next enquiry must be, what *extent of Sail* our Vessel must carry, and consequently the *length of the Masts* and *Yards*, and then of their *thickness* and *weight*; and from thence the size of the *rigging*, and from thence the *Wind-sail*, and from thence the *Cables* and *Anchors*, and from thence all the *Capstierns* and *Windlass Boats*, *Bitts*, *Catheads* and *Davits*.

In the next place we are to consider the *quality*, *quantity* and *weight* of our *ballast*, so as the Ship may stoop but according to our intention, and according to the *strength* of our *Masts* and *Shrouds*.

Having thus found out our second Water-line, which I call the *sailing-line*, as the *first* was called the *launching-line*: Now we come to the *third* which is the *line of War*. And this is to be discovered by computing the *weight* first of the *Ordnance*, which suppose to be in a Man of War, one *6th*. part of what is between the *Sailing-line*, and the *line of Burthen*, or *fourth Line*. Secondly, the *weight* of *Men* with three *months Victuals*; in order thereunto we must determine the number of Men for *sailing* from the *Spread of Canvas*, and the number of Men for *fighting* from the *Amplitude* of the *Deck*, and *weight* of the *Ordnance*.

Having found out the said Line, and considered the *distance* of *Trunnions* of the *Guns* from the *Gun-deck*, and the distance of the *Muzzels* of the *Guns* levelled from the surface of the water, we come at length to determine the place of the *Gun-deck*, and consequently of the other *Deck*.

Memorandum, That the *superstructions* upon the upper Deck are not only for the *Accommodation* of Men, but also *fortifications* of the Ship; forasmuch as the Guns in the

Fore-castle and *Steerage* clear the *Deck*, as those of the *Round house* do the *Quarter deck*.

Having found the *dimensions* of the Masts, we next come to the *place* of them, *viz.* by what points of the Gun-deck they must pass, and here we must consider the reasons of their *raking aft*; as also of the *steering* of the *Boulsprit*, and withal the reasons of placing the *Fore-mast* before or behind the *Main-mast*, and of dividing each Mast into three parts, and the *proportion* of the *round Tops*, *main Stays*, the *place* and *fitting* of the *Shrowds* so as to make way for the *gibbing* of the *Yards*, and setting of the Shrowds *loose* or *tore* as the Condition of Sailing of the Vessel requires.

CHAP. III.

1. THe reason of Ships going against the *Wind*, and in what proportion she maketh way between her being *right afore the wind*, and lying within five *points of the wind*.

2. The whole Doctrine of *Steering* and *Rudders*.

3. The whole doctrine of *Mooring* and *Anchors*.

4. Of the *Lee-boards*, their use, dimension and place.

5. What Sails, *Masts*, *Yards*, and *Rigging* is fittest for every size and sorts of Vessels, according to the *Seas* and *service* whereunto it is to be applyed.

6. Of the *Shape*, *Cutting*, *Sowing*, and *Setting in of Sails* into the *Headropes* and *Boltropes*; of the several *substance* and *thickness* of *Sails*, and of the Effect and Welling them, Easing of Shrowds, Looseness of Masts, and upper Masts.

7. Of the Effects of true *Trim*, shutting up the *Ports*, general Quietness, firing of *Stern-pieces*, and the best course upon a *Chase*.

8. How *Top-sails*, *Stooping*, *Weather*, or *Lee-ward Helm*; as also how the *Keel*, *Gripe*, and *Mizen Sail*, may be fitted

fitted to *promote* or *hinder* the *Sailing* upon occasion.

9. What makes a Ship Roll and *Labour* much in the Sea; what makes her *wear* and *stay* well; and what makes her ride *hard* or *easie* at an *Anchor*: what makes her *pitch* and *scend* too much: what makes her *sail easie* or *hard* into the Sea; what makes her *Leeward* or *keep a good Wind*.

10. Of the just *proportion* of *Sails* with *more* or *less*, that which will make the Ship go *worse*; of *Equations* between the *spread* of *Sails*, and the *Velocity of the Wind*: Of the utmost *Velocity* of a Ship with *Wind* and *Tide*: Of the proportion of the *counter-resistance* of *winds* or *tides*; why some Ships sail better with *much*, and some with *less* proportionably.

11. How to compute the *Impediment* which *Foulness* and Weeds do make in a Ships way, and in what proportion *Smoothness*, *Soap* and *Tallow* doth *quicken* it.

12. How a Ship is to be fitted with *Decks*, to beat it up to windward in foul weather, why the *Fore-sail* must be *less* than the *Main-sail*.

CHAP. IV.

WE have hitherto supposed the *Ship* to be exactly shaped inside and outside out of one simple *Log* of Wood, which being impossible to do otherwise in Speculation, it is necessary to come at length to the practical part of *Ship-Carpentry*, which is the Art of imitating the moddel afore-mentioned, and of composing a Ship, not out of one but several thousand pieces of Wood and Iron: Wherefore this Chapter shall comprehend as followeth.

1. The History of the *Practice* of the best *Shipwrights* in *England*, *Holland*, and *Portugal*, in their *building Ships* as aforesaid.

2. Sup-

2. Supposing that a Ship commonly reckoned 150 Tun, be a *fit size* to sail in round the World: And that the just strength of every part of the same were certainly known and determined, 'tis desired to know of what size and scantling *each correspondent* Timber must be of, to make a *greater* or *lesser* Vessel of equal strength, and to compute the *difference* of strength between *greater* and *smaller* Vessels of the common Built.

3. How to make practical *Equations* between the strength of *Timber* and *Irons*, and between *Trenailes* and *Bolts*, &c.

4. Out of what *Data* arises the knowledge of the strength of *Knees*, *Bolts* and *Nails*.

5. That vast Ships of 1500 *Tuns*, do require a *different* way of *Carpentry* of *Masts* and *Yards* than what is used, and particularly in no Case a Mast above 30 inches *through* and above $\frac{1}{4}$ the present *length*, is requisite.

CHAP. V.

1. WHat *Alterations* in Shipping, the use of the *Compass* and *Guns* have produced, and consequently how to conjecture what was the Shipping of the *Ancients* in these Countreys.

2. How the *difference of the Materials* for Building, the difference of Trades and Commodities, and the differences of *defensive* and *offensive* Warfare, doth occasion differences of *Shipping* in the several parts of the present World.

3. The History of the *Improvement* of Shipping, sailing upon a Wind, and *Advance* of the Shipping Trade for the last Twenty years, by the *Portugals*, *Genoveses*, *English*, *Netherlands*, and the inhabitants of *Baltick*.

4. A Description of several Attempts which have been made

made these last twenty years for the improvement of Shipping, with the respective *Success* and *Failure* of each.

The SECOND PART,

Being of

NAVAL POLICY.

CHAP. I.

THat the *King* of *England*, being not only by Right and Custom *Soveraign* of the *Narrow Seas*, but having also the best Means and most Concernment to be more considerable at Sea, than any other *Prince* or *State*; it is therefore his *Interest* to know and discover as followeth.

1. How many *Tuns of Shipping* there be in the whole *Comercial* World, from 15 to 1500 *Tuns*, as are able to cross the Seas, and how many Ships there be of each Century of times, with the said 15 Centuries.

2. How many *Ordnance* belong to them, and of what *weight*.

3. How many *Seamen* there are in all, and particularly of such as have served three years at Sea.

4. To have *Lists* of all the Ships and *Seamen* belonging to any *Ports* or places within his own Dominions; and a ready Method to know *where* they are at all times, at *home*, or at *Sea*.

5. What *Harbours* and *Ports* there are in the whole *Commercial World*; unto which *Shipping* does belong, and what

Ships

Ships they are able to receive, what are the special *advantages* and *inconveniences* of each.

6. What is the *Wages* and *Rate* of *Victuals* for *Seamen* in each *State*.

7. To have intelligence of all *Privateers*, *Pickeroons*, and *Pirates* which are *abroad* at all times; and in a forwardness to go forth.

From hence only his *Majesty* can know how to proportion his *Navy*, (that is to say) his Navy cannot or need not consist of *more Tunns* of Shipping than are *Seamen* of his Subjects, and *one quarter* more; I say, *greater* it cannot well be, and it need not be much *bigger* than of *so many* Tunns of Shipping; than any two of his *Neighbour States* have Man to Man with preservation of their Trade: And the intelligence last mentioned determins the *number* and *sorts* of Ships which are to be always in readiness. Moreover, the *Kings Navy* must be of Ships above *600 Tunns*, but need not have *half* so many *lesser* as will suffice in time of Exigence, for such may be hired from Merchants.

CHAP. II.

1. OF the *Advantages* ſcituate upon the *Sea* and *Navigable rivers*.

2. Of the *benefit* of a Shipping Trade in General.

3. Of the *Fiſhing Trade*, and how far the Subjects of the King of *England* are able to manage it, and what have hitherto been the *Impediments* thereof.

4. Whether it were for the *benefit* of the Commonwealth, that *Coals* were found near *London*: And that good *Tobacco* and *Sugars* would grow in *England*, for as much as a parcel of proper fitting ground of twelve mile ſquare, would bear as much of theſe Commodities as do now come from *Amerika*.

5. Of

5. Of what benefit to the World is the Discovery of new *Countries*, new *Passages*, new *Mines* of *Gold*, of *Silver*, and of the *Longitude* it self.

6. What *Increase* of *Trade* doth really signifie and import.

7. The effect of depending upon *forraign* Countries for *Hemp*, *Tarr*, *Masts*, *Rosin*, and *Sail-Cloath*.

8. Of the whole *Expence* of a *Fleet*, how much of that from *forraign* Countries, and how much in the *Dominions* in value.

9. The same *English* men who now work upon exposed *Commodities*, as *woollen Manufactures*, *Lead*, *Tinn*, &c. did go to Sea in Men of War. *Quer.* Whether they would not take as much *Commodities* by way of *Price*, as they now receive in Exchange for their said *Expectation*.

10. Of the *Decay* of *Timber* in *England*, *Scotland*, and *Ireland*, with the Causes and Consequences, and Remedies thereof.

CHAP. III.

1. WHether *Landmen* and not *Seamen* bred, be fitter to Command at Sea.

2. Of all the Men in a *Fleet* of War, how many ought to be *perfect Seamen*, how many of five lower degrees, and how many may be *Landmen*.

3. How, in what time *Land Soldiers*, and other Tradesmen of labour may be made Auxiliary Seamen, and *how many* such may be requisite in Cases *ordinary* and *extraordinary*, and *how* the said Men may be encouraged and employed at Land to the publick benefit.

4. Of allowing encouragement to *Supernumerary Seamen*, with the number of them, and how to *assist* such Seamen as are low of employment.

Of

Of NAVAL OECONOMY or HUSBANDRY.

The Third PART.

HAving determined the *number* of the Tuns of Shipping of which the *whole Navy* is to consist, and *how many Ships* in number they ought to be; as also *how many* of each *sort* and *rate*, and in what and *how many Harbours* they are to be kept, so as to be ready to put to Sea upon any Occasion; it remains to set forth *how* the same may be done with the *least Charge*, and with the *least Expence* of *foreign Commodities*, to which purpose the following particulars are to be considered.

1. Forasmuch as a *Ship* doth commonly Reign about thirty *years*, it follows, that the 30th. part of *Tunns* of *Shipping*, of which the *whole Navy* consists, must be new built every year, the which may probably cost 15 *l. per Ann.* with *Gunners*, *Boatswains*, and *Carpenters* stores.

2. The Charge of the *English Navy* in *ordinary* has by experience amounted to 10 *s. per Tunn*, per *Annum*.

3. For charge of maintaining a Man of Warr at Sea, completely *fitted*, *victualled*, and *manned*, with the *expence*, *wear*, and *tear* of all manner of *stores*, doth amount to 24 *l. per Ann.*

4. There are *Estimates* by which Money must be provided for the use of the *Navy*, but by good husbandry the Charge may be defrayed at a more easie Rate; wherefore we shall in the next place describe Historically the present way of managing his Majesties *Navy* in *England*, and afterwards make some animadversions upon each of the *three* great branches of that *Expence*, which is *Wages*, *Victuals*, and *Stores*, subdividing each of them again into several other branches as the Nature of the thing and Custom requires.

FINIS.

ADVERTISEMENT

To all who have Occasion to make Use of

8°. M. 201. Art.

Sheet-Lead.

ALL New Inventions (being proposed (as better and cheaper) to [illegible] something before used for the same purpose) must expect to meet with great Opposition; for some particular Persons, and some Trades which consist of many Persons being concerned in Point of Interest, right or wrong, they will decry that which is against their profit, and procure as many others as they can to do so too; this being the Case of the *Plumbers* with those concerned in the *Milled Lead*, whoever has Occasion to make use of *Sheet-Lead* ought not to regard what Interested Persons say on either side, but to weigh and consider with himself the Reasons offered, and to examine the truth of what's said on both sides: The *Mill'd-Lead* Company have Printed many of their Reasons some time since, in a Paper at large; amongst which, to say nothing of its solidity, smoothness, &c. the *Equality* of *Mill'd-Lead* alone is sufficient to prove it much better, and (at the Companys Rates in proportion to the least *Inequality* that can be granted in *Cast-lead*) much cheaper, which also may further appear from the Considerations following.

1. It is agreed by all, that if the *Plumber* could cast his Lead exactly [illegible] the thinnest part thereof, it would be better than to be thicker in one place than another, so that the excess of thickness is not only unnecessarily paid for, but it makes the Sheet worse, and helps to crack and cockle the thinner parts, by its stronger resisting the Sun-beams, and other Accidents of Weather, [illegible] falling equally on all parts alike, draws the thinner parts, when the thicker stay behind, which causes that Cockling and cracking therein: Wherefore, if *Mill'd-Lead* be thicker than the thinnest part of a cast Sheet, it must be allowed to be *better* and to last *longer*, and a *less* quantity of Lead being imployed, it may be *cheaper* to what degree in proportion to *Cast Lead* the Customer shall judge it convenient and sufficient for the purpose designed to have the *thickness* of his Mill'd-Lead to be.

2. The wasting and decay of *Sheet-Lead* being chiefly beneath by the [illegible] moisture contracted between it and the plain it lyes on (turning it into White-Lead,) that accident which the *thinner* as well as the *thicker* parts are alike [illegible] to, shews the great mischief that attends a Cast-Lead covering in this respect also.

3. These particulars as well as the *Plumbers* vain pretence to near *Equality*, and endeavour to cast as equal as he can, shew the excellency of *Equality* in Sheet-Lead, and consequently that is so much the *worse*, by how much it deviates from *Equality*, and this *Inequality* in a sheet of Lead being an Object of Sense, any Man that has but his eyes in his head may be as good a Judge thereof as the best Architect, Surveyor or Plumber in *England*; and if he please but to give himself the trouble of viewing indifferently the *Coverings* upon Houses in *London*, since the Re-building, and cut a snip from the *thickest* and *thinnest* part of the edge of any Sheet he can come at, he will generally find *Cast-Lead* to be a third, or at least a fourth part thicker, nay, many times above twice as thick in some places as in others, and the *Coverings* for the most part *crack'd, cockled* and patcht with *Solder*, if they have not been *new laid*, as many have been since the *Fire*, particularly the *Royal Exchange* and *Cordwainers-Hall* new Covered four or five Years ago; the *Kings Head*, a Confectioners by *Ludgate*, part new covered about seven Years since, and the new as well as the old cracked, cockled, and patcht with Solder; the *Eagle and Child* in *Tower-street*, stript and new laid in 1676. Mr. *Clark's* House, next the *Bell* in *Fryday-street*, twice laid since the Fire, and abundance more *new Covered*, too long here to mention; and where the old are lye, this decay and patching generally appears: Whereas such Coverings as have been *laid with Mill'd-Lead*, some not above 6 *l.* to the Foot, ten or twelve Years ago, lye as well as at first laying, and in all probability will so continue many Years, as to instance in a few: At Mr. *Wagstaffe's*, next the Hand and Pen in *Queen-Street*, a Covering about 30 Foot square, with Sheets the full length [illegible] *Mr. Shiners's* Buildings in the *Inner-Temple*, with Sheets 24 Foot long, where a Cast-Lead patching of Cast-Lead by, at the same time laid, being compared, the Decay complained of will plainly appear in these; as at Mr. *Grayham's* House in the *Pall-Mall*, and divers others too long also to [illegible] mention; besides many more [illegible] Houses near *Rotherwick* in *Hampshire*, [illegible] Sheets 24 Foot long; [illegible] [illegible] [illegible]

Rept. H.W.C. 18-5-49